

Project Manual for

STEUBENVILLE CITY SCHOOLS

Steubenville, OH

Steubenville High School STEM Building



PREPARED BY:

HASENSTAB ARCHITECTS, INC.

190 NORTH UNION STREET, SUITE 400

AKRON, OHIO 44304

TEL. 330.434.4464

FAX. 330.434.8546



Dennis Check, License #8909110
Expiration Date: 12/31/2023

Project No. 21042.000
CD Issue Date: May 20, 2022
Construction Documents
Volume I
Conformed Documents

TABLE OF CONTENTS

Division &
Section No. Title

VOLUME I

BIDDING DOCUMENTS

001113 Notice to Bidders
003132 Geotechnical Data
004113 Bid Form
005000 Contracting Forms and Supplements

CONDITIONS OF THE CONTRACT

007200 AIA Document A201, 2017 Edition, General Conditions of the Contract for Construction
007310 Special Conditions

DIVISION 1 – GENERAL REQUIREMENTS

011000 Summary
011001 Bid Packages
011400 Work Restrictions
011403 Unit Prices
012300 Alternates
012500 Substitution Procedures
012600 Contract Modification Procedures
012900 Payment Procedures
013100 Project Management and Coordination
013110 Coordination Drawings
013200 Construction Progress Documentation
013300 Submittal Procedures
014000 Quality Requirements
014001 Mock Ups
014100 Statement of Special Inspections
014200 References
015000 Temporary Facilities and Controls
016000 Product Requirements
017300 Execution
017329 Cutting and Patching
017419 Construction Waste Management
017700 Closeout Procedures
017823 Operation and Maintenance Data
017839 Project Record Documents
017900 Demonstration and Training
018113.14 Sustainable Design Requirements
019100 Commissioning

DIVISION 2 – EXISTING CONDITIONS

024119 Selective Structure Demolition

DIVISION 3 – CONCRETE

033000 Cast-in-Place Concrete
033543 Polished Concrete Finishing
034800 Precast Concrete Specialties

DIVISION 4 – MASONRY

042000 Unit Masonry

DIVISION 5 – METALS

051200	Structural Steel Framing
053100	Steel Decking
054000	Cold-Formed Metal Framing
055000	Metal Fabrications
055113	Metal Pan Stairs
055213	Pipe and Tube Railings
057300	Decorative Metal Railings

DIVISION 6 – WOOD AND PLASTICS

061053	Miscellaneous Rough Carpentry
061600	Sheathing
064023	Interior Architectural Woodwork
064213	Stacked Wood Paneling
066400	Plastic Paneling

DIVISION 7 – THERMAL AND MOISTURE PROTECTION

071326	Self-Adhering Sheet Waterproofing
072100	Thermal Insulation
072119	Foamed-In-Place Insulation
072726	Fluid-Applied Membrane Air and Water-Resistive Barriers
074213.13	Formed Metal Wall Panels
074213.23	Metal Composite Material Wall Panels
074229	Terracotta Wall Panels
075323	EPDM Roofing
076200	Sheet Metal Flashing and Trim
077100	Roof Specialties
077200	Roof Accessories
078413	Penetration Firestopping
078443	Joint Firestopping
079200	Joint Sealants
079513.13	Interior Expansion Joint Cover Assemblies
079513.16	Exterior Expansion Joint Cover Assemblies

DIVISION 8 – DOORS AND WINDOWS

081113	Hollow Metal Doors and Frames
081416	Flush Wood Doors
083113	Access Doors and Frames
083613	Sectional Doors
084113	Aluminum-Framed Entrances and Storefronts
084413	Glazed Aluminum Curtain Walls
087100	Door Hardware
087113	Automatic Door Operators
088000	Glazing
089119	Fixed Louvers

DIVISION 9 – FINISHES

091001	Floor Preparation
092116.23	Gypsum Board Shaft Wall Assemblies
092216	Non-Structural Metal Framing
092900	Gypsum Board
093013	Ceramic Tiling
095113	Acoustical Panel Ceilings
095133	Acoustical Metal Pan Ceilings
095434	Acoustical Baffle Ceilings
096400	Wood Flooring
096513	Resilient Base and Accessories
096519	Resilient Tile Flooring

DIVISION 9 – FINISHES – Con't.

- 096813 Tile Carpeting
- 099113 Exterior Painting
- 099123 Interior Painting

DIVISION 10 – SPECIALTIES

- 101100 Visual Display Surfaces
- 101419 Dimensional Letter Signage
- 101423 Panel Signage
- 102113.19 Plastic Toilet Compartments
- 102600 Wall Protection
- 102800 Toilet, Bath, and Laundry Accessories
- 104100 Emergency Access Cabinets
- 104413 Fire Protection Cabinets
- 104416 Fire Extinguishers
- 105113 Metal Lockers

DIVISION 11 – EQUIPMENT

- 116100 Laboratory Fume hoods

DIVISION 12 – FURNISHINGS

- 122413 Roller Window Shades
- 123553 Laboratory Casework

DIVISION 13 – SPECIAL CONSTRUCTION

Not Used

DIVISION 14 – CONVEYING SYSTEMS

- 142123.16 Machine Room-Less Electric Traction Passenger Elevators

VOLUME II

DIVISION 21 – FIRE SUPPRESSION

- 210010 Document Interpretation and General Requirements
- 210110 Project Submittal Requirements
- 210130 Coordination Drawings
- 210210 Owner Operating and Maintenance Training
- 210310 System and Component Flushing and Testing
- 210320 Fire Pump Testing
- 210420 Painting
- 210440 Equipment Pads
- 210510 Electrical Requirements for Fire Protection Equipment
- 210710 Penetrations and Sleeves
- 210720 Firestopping
- 210910 Hydraulic Design Requirements
- 211010 Common Piping Requirements
- 211020 Wet-Pipe System Piping
- 211030 Water Service Piping
- 211210 Piping Identification
- 211220 Piping Hangers and Supports
- 211230 Pressure Gauges
- 211240 Fire Pump Test Headers
- 211310 Fire Protection Valves
- 211340 Suction Control Valves
- 212010 Equipment Identification
- 212111 Electric Vertical In-Line Fire Pumps
- 212120 Electric Vertical Multi-Stage Jockey Pumps

DIVISION 21 – FIRE SUPPRESSION – Con’t.

- 212210 Double Detector Check Backflow Preventers
- 212520 Fire Department Siamese Connections
- 213110 Sprinkler Heads
- 213210 Flow and Tamper Switches

DIVISION 22 – PLUMBING

- 220010 Document Interpretation and General Requirements
- 220090 LEED Requirements
- 220110 Project Submittal Requirements
- 220130 Coordination Drawings
- 220210 Owner Operating and Maintenance Training
- 220310 Piping Systems Flushing and Testing
- 220320 Equipment and System Start-up
- 220350 Commissioning of Plumbing Systems and Components
- 220420 Painting
- 220430 Excavation, Trenching, Backfilling, and Paving
- 220440 Equipment Pads
- 220510 Electrical Requirements for Plumbing Equipment
- 220520 Variable Frequency Drives
- 220710 Penetrations and Sleeves
- 220720 Firestopping
- 220730 Roof Curbs
- 220740 Miscellaneous Steel Supports
- 220810 Vibration Isolation
- 221010 Common Piping Requirements
- 221020 Drain, Waste and Vent Piping
- 221030 Domestic Water Piping
- 221031 Water Service Piping
- 221040 Natural Gas Piping
- 221051 Laboratory Air, Gas and Vacuum Piping
- 221060 Acid Waste and Vent Piping
- 221080 Compressed Air Piping
- 221090 Flue and Vent Piping
- 221110 Piping Insulation
- 221210 Piping Identification
- 221220 Piping Hangers and Supports
- 221230 Thermometers and Gauges
- 221240 Flexible Pipe Connectors
- 221250 Water Hammer Arrestors
- 221260 Cleanouts
- 221310 Domestic Water Valves
- 221311 Domestic Water Mixing Valves
- 221320 Natural Gas Valves
- 221321 Natural Gas Pressure Regulators
- 221351 Laboratory Vacuum Valves
- 221380 Compressed Air Valves
- 221410 Reduced Pressure Backflow Preventers
- 221420 Dual Check Backflow Preventers
- 221730 Strainers
- 221811 Bladder Type Expansion Tanks
- 221910 Water Flow Sub-Meters
- 221940 Natural Gas Sub-Meters
- 222010 Equipment Identification
- 222020 Equipment Insulation
- 222111 High Efficiency Gas-Fired Water Heaters
- 222411 Skid Mounted Domestic Booster Pumps
- 222420 Recirculation Pumps

DIVISION 22 – PLUMBING (Con’t)

222434	Hydraulic Elevator Pit Sump Pumps
222710	Laboratory Air Compressors
222720	Laboratory Vacuum Pumps
223040	Acid Waste Sumps
224011	Water Closets
224012	Urinals
224014	Lavatories
224020	Stainless Steel Sinks
224030	Laundry Sinks
224032	Mop Basins (Terrazzo)
224043	Gas Turrets
224050	Electric Water Coolers
224090	Emergency Fixtures
224110	Drains and Trap Primers
224210	Hose Bibbs

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING

230010	Document Interpretation and General Requirements
230090	LEED Requirements
230110	Project Submittal Requirements
230130	Coordination Drawings
230210	Owner Operating and Maintenance Training
230310	Hydronic Piping Systems Flushing and Testing
230320	Equipment and System Start-up
230330	Testing, Adjusting and Balancing
230340	Ductwork Leakage Testing
230350	Commissioning of Mechanical Systems and Components
230420	Painting
230440	Concrete Equipment Pads
230510	Electrical Requirements for Mechanical Equipment
230520	Variable Frequency Drives
230710	Penetrations and Sleeves
230711	Roof Penetration Curbs
230720	Firestopping
230730	Miscellaneous Steel and Supports
230810	Vibration Isolation
231010	Common Piping Requirements
231020	Hydronic Piping
231040	Refrigerant Piping
231110	Piping Insulation
231210	Piping Identification
231220	Piping Hangers and Supports
231230	Thermometers and Gauges
231240	Flexible Pipe Connectors
231310	Hydronic Valves
231340	Refrigerant Valves
231410	Hydronic Manual Balance Valves
231420	Hydronic Automatic Balance Valves
231430	Hydronic Coil Piping Packages
231510	Flow Measuring Devices – Venturi
231610	Closed Loop Water Treatment Systems
231710	Air Separators
231730	Strainers
231810	Bladder Type Expansion Tanks
232010	Metal Ductwork
232020	Flexible Ductwork

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING (Con't)

232050	Breeching and Vents
232110	External Ductwork Insulation
232120	Internal Ductwork Liner
232210	Grilles and Diffusers
232220	Ductwork Access Doors
232230	Manual Balance Dampers
232235	Gravity Backdraft Dampers
232240	Fire Dampers
232310	Louvers
233010	Equipment Identification
233020	Equipment Insulation
233352	Gas-Fired Stainless Steel Condensing Boilers
233410	End Suction Pumps
235011	Centrifugal Roof Exhaust Fans
235013	Inline Centrifugal Fans
235018	Ceiling Toilet Exhaust Fans
235050	Propeller Fans
236010	Packaged Rooftop Units
237310	Single Duct Terminal Boxes with Hydronic Reheat
237420	Series Fan Powered Terminal Boxes with Hydronic Heat
237610	Hydronic Unit Heaters
237640	Gas-Fired Unit Heaters
237710	Hydronic Cabinet Unit Heaters
237730	Electric Cabinet Unit Heaters
238110	Ductless Split Air Conditioning Systems
239010	Instrumentation and Control for HVAC
239210	Wire and Cable
239211	Conduit Systems
239212	Pulling Cables
239310	Control Devices
239320	Electronic Control Valves and Actuators
239330	Electronic Control Dampers and Actuators
239350	Hydronic Energy Measurement Systems
239510	General Programming Requirements
239910	Sequences of Operation

DIVISION 26 – ELECTRICAL

260051	Basic Materials and Methods
260052	Tests
260053	General Wiring
260054	Cutting and Patching
260055	Temporary Power
260056	Firestopping
260060	Excavating, Trenching, Backfilling and Restoration
260074	Electrical Demolition and Salvage
260111	Conduit Systems
260114	Cable Tray
260120	Wire and Cable
260125	Pulling Cables
260140	Wiring Devices and Plates
260151	Motor Wiring
260152	Wiring of Equipment Furnished Under Other Divisions
260154	Fractional Horsepower Motor Starters
260155	Combination Motor Starters
260162	Distribution Switchboards
260164	Circuit Breaker Distribution Panelboards
260165	Branch Circuit Panelboards

DIVISION 26 – ELECTRICAL (Con’t)

260170	Disconnect Switches
260171	Surge Suppression
260181	Fuses
260216	Standby Power Generation
260250	Automatic Transfer Switch
260450	Grounding
260461	Dry Type Distribution Transformers
260501	Lighting
260601	Lightning Protection System
260916	Lighting Control System
260932	Automatic Lighting Controls
260950	Electrical Bid Alternates

DIVISION 27– COMMUNICATIONS

270051	Basic Materials and Methods
270740	Communication Cabling and Equipment
270770	Paging System
270771	Classroom Sound System
270782	Audio/Visual Systems

DIVISION 28 – ELECTRONIC SAFETY AND SECURITY

280051	Basic Materials and Methods
280721	Fire Alarm and Detection System

DIVISION 31 – EARTHWORK

311000	Site Clearing
312000	Earth Moving
312219	Finished Grading
312319	Dewatering
312500	Erosion & Sedimentation Controls

DIVISION 32 – EXTERIOR IMPROVEMENTS

321216	Asphalt Paving
321313	Concrete Paving
321373	Concrete Paving Joint Sealants
323119	Decorative Metal Fences and Gates
329200	Lawn – Seed

DIVISION 33 – UTILITIES

330500	Common Work Results for Utilities
331000	Facility Water Distribution Piping
333000	Facility Sanitary Sewers
334100	Storm Utility Drainage Piping
334600	Subdrainage

END OF TABLE OF CONTENTS

Steubenville City School District

SECTION 001113

NOTICE TO BIDDERS

Bids will be received by Grae-Con Construction at the Steubenville Office located at 880 Kingsdale Road Steubenville, Ohio 43952 for the following Project:

Steubenville High School District
New STEM Facility Project
Steubenville, Ohio, Jefferson County

in accordance with the Contract Documents prepared by:

Hasenstab Architects
190 N. Union Street
Akron, Ohio 44304
P: (330) 434-4462
www.hasenstabinc.com

The Construction Manager at Risk for the Project is:
Grae-Con Construction
880 Kingsdale Road
Steubenville, Ohio, 43952
www.graecon.com

Bids will be received for:

Bid Package

01 Sitework	11 Glass & Glazing
02 Paving	12 Tile
03 Concrete	13 Flooring
04 Masonry	14 Painting
05 Structural/Misc. Steel	15 Polished Concrete
06 General Trades	16 Elevators
07 Metal Panels	17 Fire Protection
08 Terracotta Panels	18 Plumbing
09 Roofing	19 HVAC
10 Framing / GWB / Acoustic Ceilings	20 Electrical

Until **July 7th 2022, at 3:00 p.m.**, in Grae-Con Construction office at the address located above. **BIDS MUST BE RECEIVED ON THE INCLUDED BID FORM AND MAY BE SUBMITTED VIA E-MAIL, MAIL, HAND DELIVERED.**

BIDS SHALL BE SUBMITTED TO ATTENTION: James McKeegan (jmckeegan@graecon.com)

A non-mandatory pre-bid meeting will be held on Thursday, June 9, 2022 at 9:30 a.m. The location will be at 316 North 4th Street, Steubenville, Ohio.

All bidders shall include 100% payment and performance bonds.

Any questions pertaining to the interpretation of the Contract Documents are to be submitted in email to the Construction Manager as identified below:

Grae-Con Construction Inc.
ATTN: James McKeegan
Email: jmckeegan@graecon.com

No questions will be heard after 5:00 PM on June 27th, 2022. Answers deemed necessary will be given in the form of an Addendum to the Bidding Documents and issued to firms on record with Grae-Con Construction as Confirmed Bidding Contractors. Bidders may submit requests for consideration of a proposed Substitution for a specified product, equipment, or service to the Architect through Grae-Con Construction **until 5:00 PM on June 27th 2022**. Additional products, equipment, and services may be accepted as approved Substitutions only by written Addendum.

Only Confirmed, Pre-Qualified Contractors will receive Bid Documents. Documents to prequalified contractors will be distributed via email link to a SmartBid Link.

Bid documents can also be viewed or downloaded by the Grae-Con Construction SmartBid link.

Equal Employment Opportunity and Drug Free Safety Policy requirements are applicable to this Project.

Prevailing Wage rates are applicable to this Project.

The project will comply and achieve LEED Silver certification. Each subcontractor shall submit all LEED documentation required for the project as requested by the Architect. LEED Documentation is to be provided as part of this project. Examples of this would include supplier/manufacturers for all equipment, recycled content of all materials, landfill disposal certificates, photographic evidence needed for each individual credit attempted during the construction phase, etc.

END OF SECTION

SECTION 003132

GEOTECHNICAL DATA

PART 1 - GENERAL

1.1 SUMMARY

- A. A subsurface investigation has been performed at the project site and is being made available to the Contractors.
- B. Contractor is responsible to review geotechnical data, visit the site, and acquaint himself with all existing conditions.
- C. The subsurface information is available for Contractor information, but is not a warranty of subsurface conditions, neither does it warrant conditions between or beyond borings, nor will the Owner, Developer, Tenant or his consultants be held responsible for accuracy of the information.
- D. Conditions between boring locations may vary considerably and it should not be expected that they will be precisely represented by any one boring.
- E. Refer to attached copy of subsurface investigation report.

PART 2 – PRODUCTS

Not Applicable

PART 3 – EXECUTION

Not Applicable

END OF SECTION

SUBSURFACE EXPLORATION REPORT

For

Steubenville High School Addition
420 North 4th Street
Steubenville, Ohio

Date

August 28, 2021

Prepared for:

Steubenville City Schools
611 North 4th Street
Steubenville, Ohio 43952

Prepared by:

Summit Testing & Inspection Company



910 White Pond Drive
Akron, Ohio 44320
Tel: (330) 869-6606
Fax: (330) 869-6437
www.SummitTesting.com

ST&I Project N^o.

G21-11825

TABLE OF CONTENTS

Steubenville High School Addition
420 North 4th Street
Steubenville, Ohio

1.0 DESCRIPTION OF PROPOSED PROJECT AND EXISTING SITE

2.0 FIELD EXPLORATION

3.0 LABORATORY TESTING

4.0 SUBSURFACE PROFILE

4.1 Soil Profile

4.2 Groundwater

5.0 ENGINEERING ANALYSIS

6.0 RECOMMENDATIONS

6.1 Site Preparation and Earthwork

6.2 Foundations

6.3 Below Grade Walls

6.4 Seismic Site Class

6.5 Slabs-on-grade and Pavements

6.6 Temporary Excavations

7.0 FIELD OBSERVATIONS

8.0 GENERAL CONSIDERATIONS AND LIMITATIONS

8.1 Standard of Care

APPENDIX

- Boring Location Plan
- Boring Logs
- Key to Symbols

SUBSURFACE EXPLORATION REPORT

The following is the subsurface soil exploration report that we completed for the planned improvements to the existing school facility. This study was made to determine subsurface soil characteristics across the site so our engineers could offer recommendations regarding project specific geotechnical engineering issues.

1.0 DESCRIPTION OF PROPOSED PROJECT AND EXISTING SITE

Plans call for a one to three-story, slab-on-grade addition approximately measuring 140.0 x 250.0 feet and located South of Dock Street and East of North 4th Street as positioned on attached “Boring Location Plan”. The planned addition will connect to the existing school facility by a “sky bridge” over Dock Street. A single-story “Green House” will be located to the Northeast corner of site. Construction will consist of isolated steel columns and masonry veneer with above grade concrete floors supported on metal decking. Maximum column and strip footings loads have been estimated at 150,000 pounds and 4,500 pounds per lineal foot, respectively. The sky bridge will likely be supported on 4 piers each imposing approximate loads of 100,000 pounds. The floor elevation of the addition has been established at elevation 707.5 therefore the site will required up to 3.0 feet of cuts/fills. We anticipate excavations for underground utilities not to exceed 12.0 feet below current ground surfaces. *To note, the site is currently occupied by (3) buildings and numerous residences and multi-story buildings once existed on the subject property thus we anticipated poorly backfilled basement cavities.*

The subject 0.74+/- acre site is located South of Dock Street, West of Court Street, and East at North 4th Street in Steubenville, Ohio as detailed on attached “Boring Location Plan”. At the time of our field exploration, the topography of the site is relatively flat with a slight drop in grade heading East. The site currently has three buildings two of which have basements with remaining groundcover consisting of asphalt pavements and random maintained lawn areas. A sinkhole exists within the parking lot to the rear of the Salvation Army building located at 332 North 4th Street and located approximately 10.0 feet West of test boring SB-3. Review of historical aerial imagery from 1949 shows additions residential structures within the footprint of the planned improvements.

2.0 FIELD EXPLORATION

The field exploration commenced on July 20th when a total of seven (7) test locations were marked on the field with white paint or wood lathe with white tape by ST&I personnel. Then on July 27th, all borings were advanced with a truck mounted, medium capacity, rotary drill and continuous flight, hollow stem augers. The borings were terminated at the planned exploration depths of 25.0 feet with one boring extended to a depth of 50 feet. The approximate test positions are shown on the attached “Boring Location Plan” that follows at the end of this written section of report.

While drilling, split spoon samples of the subsurface soils were obtained as the drillers performed the Standard Penetration Tests (SPT). The soils were visually-manually classified at the site by a member of our staff and/or the drillers and representative portions of each sample were sealed in glass jars to preserve moisture during transport to our soil mechanics laboratory for verification of the field descriptions and testing.

3.0 LABORATORY TESTING

Due to the consistency of the soils no laboratory testing is deemed necessary at this time.

4.0 SUBSURFACE PROFILE

Based on the information acquired in the field exploration and laboratory testing, along with the necessary assumption that subsurface conditions between, away from and below individual sampling locations and depths are similar to those shown below, the subsurface profile can be generally described as follows:

4.1 Soil Profile

Initially, the augers penetrated either asphalt pavement structures (i.e., consisting of 5.0 to 6.0 inches asphalt / 6.0 to 12.0 inches slag aggregate base) or 6.0 to 18.0 inches of topsoil. Below the surface layers the test holes identified 2.0 to 5.0 feet thick layers of “uncontrolled fill” consisting of silty sand / sandy silt soils were identified and terminated at depth between 2.0 to 6.0 feet below the existing ground surface. Starting at 3.5 to 6.0 feet below the respective ground surfaces naturally deposited cohesionless sandy silt, sand,

silty sand & gravel / sand & gravel soils extended to termination depths of 25.0 or 50.0 feet below the ground surface. Exceptions to the preceding general subsurface soil profile existed at test hole B-2 that identified a 24.0+/- inch thick layer of “uncontrolled fill” consisting of cohesive fine-grain clayey silty soils below the surface asphalt pavement structure.

According to the SPT results (N-value column on the “Subsurface Exploration Logs”), the relative density of cohesionless soils varied from very loose very dense while the cohesionless fine-grain clayey silty soils possessed a consistency of medium stiff. Soil color was noted to be brown throughout the exploration depth except for some dark brown to black soils with the “uncontrolled fill” layers. Please see the attached “Test Boring Logs” that follow at the end of this report for more detail

4.2 Groundwater

Upon the completion, each test hole was sounded for groundwater with all holes found to be dry. “Depth to Seepage” (i.e., permeable water bearing soil layer or water on inner drilling rods) was identified in all test holes between the depths of 13.5 to 24.5 feet (AVERAGE = 16.7 feet) below the respective ground surfaces. After removing the augers, “Depth To Collapse” was measured between the depths of 12.0 to 16.0 feet (AVERAGE = 10.8 feet) below the ground surface. Depth to collapse in cohesionless soils is often a reliable indicator of the static groundwater elevation.

Based on the preceding, it is our opinion that minimal if any groundwater will be encountered during the shallow, short-term excavations of less than 12.0 feet below existing ground surface and if encountered will easily controllable with conventional sumps. We cannot rule out random isolated pockets of “perched groundwater” that will easily be controlled with conventional sumps.

Relative to groundwater control, we recommend each contractor that bids work on the project is required to make their own determination of how groundwater may affect their work so that they can include any additional cost in their bids and avoid claims for extra compensation.

5.0 ENGINEERING ANALYSIS

According to the information provided in this report, it is our opinion that the planned improvements will be properly supported by the site's subsurface soils with the following concerns:

- 1) Most of the planned structures and improvements are located in area where existing buildings once existed or will be razed, therefore the complete removal of foundations, basement slabs, and infrastructure will be required and then backfilled with "engineered fill" as detailed in the "Site Preparation And Earthwork" section of this report that follows. Several back-hoe excavated test pits shall be excavated during demolition to identify the limits of past razed structures and anticipated poorly backfilled basement cavities;

- 2) The upper 2.0 to 6.0 feet of soils just below the surface asphalt pavement structure / topsoil layers consisted of "uncontrolled fill" possessing marginal to low soil strength thus shall be further evaluated at the commencement of earthwork and remediated accordingly by one of our staff engineers or senior technicians. The "uncontrolled fill" shall be evaluated by shallow back-hoe excavated test pits and/or proofrolling per ODOT as directed by one of our on-site engineers. Corrective measures shall be directed by one of our engineers requested to the site;

- 3) The existing sinkhole at the site should also be evaluated during initial site work to determine the cause which at this time is anticipated to be a damaged storm sewer line or poorly backfilled basement cavity. The evaluation and corrective measures will be directed by one of our on-site engineers;

4) Due to the existing underground utilities along both sides of Dock Street the sky bridge may require a deep foundation to avoid damage and costs of relocating subject underground as opposed to large shallow spread footings. Deep foundations may be preferred to avoid potential future undermining of shallow spread footings from repair/replacement damaged water, sanitary, and storm sewer lines. Deep foundation systems may consist of helical piers or auger-cast piling to avoid damage to existing infrastructure and buildings due to vibrations from pile driving or associated costs of casing holes for caissons; and

5) The Ohio Department of Natural Resources mine maps did not indicate that an abandoned unground coal mine exists on property though the surrounding area has been extensively mined. Correspondence with ODNR Division of Mineral Resources and AML Emergency Program confirmed the local area has not been mined and that no files exist for past mine subsidence projects within the downtown vicinity.

6.0 RECOMMENDATIONS

Based on our interpretation of the results of this exploration, along with the necessary assumption that subsurface characteristics between, away from and below individual sampling locations and depths are similar to those described herein, the following recommendations are offered for your consideration and use on this project.

6.1 Site Preparation and Earthwork

The first stage of site preparation after razing the required structures will be to strip the pavement structures, topsoil, brush, root balls, and any obvious soft/wet soils. Surface areas at rough subgrade elevation or requiring fill should be leveled, compacted and proofrolled with a fully loaded tandem or tri-axle dump truck weighing 25-tons. The proofroll will consist of making at least two forward and back passes in each of two perpendicular directions across the site in order to detect zones of weak (loose, soft or otherwise unstable) soil that may exist at or within 2.0+/- of the ground surface. When unstable areas are found, they should be systematically corrected (e.g., scarified, dried if needed and recompacted or removed and replaced) per the recommendations of the

Summit Testing representative, who should be on site to witness the initial subgrade compaction and proofroll. We also recommend a proofroll in cut areas after excavating to the required subgrade elevation.

After the proofroll and any required remedial work, the site can be filled to grade as required. Site excavated granular soils are expected to be suitable for reuse as “engineer fill” and backfill. In general, all fill and backfill must be free of organic, frozen and other deleterious matter and particles larger than 6.0-inches in any dimension. Fill and backfill should be placed in maximum loose 8.0-inch thick measure lifts, adjusted to have moisture content within +/-2.0% of optimum dry density and then be uniformly compacted with mechanical equipment to at least 98% of the standard Proctor (ASTM D698) maximum dry density. The 98% requirement is for structure and pavement areas and 92% compaction should be acceptable for landscaped and other less settlement critical areas.

Each lift of fill and backfill should be tested for in-place density to verify that the recommended compaction percentages are obtained. We recommend at least one density test per 5,000 square feet of building or pavement area per lift, with at least three tests per lift, regardless of size of the area being filled. For trench or wall backfill, we recommend a testing frequency of not less than one per 50 lineal feet per lift. Samples of proposed fill and backfill materials should be delivered to our soil mechanics lab in sufficient time before use for plasticity and moisture-density relationship testing.

6.2 Foundations

The proposed structures will be properly supported by conventional shallow spread footings bearing on firm naturally deposited soils or engineered fill. Given that foundation subgrades are observed prior to placement of concrete and steel reinforcement foundations may be designed using a net allowable soil bearing capacity of 3,000 pounds per square foot. Given that the recommendations within this report are followed, it is our opinion that total and differential settlements will not exceed 1.0 and 0.75 inches, respectively.

Should a deep foundation system be desired, helical piers shall be designed and installed by an experienced and qualified contractor. For preliminary budgeting, we estimate 10 helical piers per rectangular footing at each end of bridge to support two columns with each helical pier extending 20.0 to 25.0 feet below footing. A total of 20 helical piers each approximately costing \$1,200.00 would equate to \$24,000 plus slight increase for additional concrete thickness and steel reinforcement.

Should augercast piling be desired the following table of pile diameters, embedment depths and ultimate load capacities has been prepared using a skin friction value of 2,000 pounds per square foot/foot of depth and a factor of safety of 2:

*Embedment Length	12.0" Diameter	14.0" Diameter	16.0" Diameter	18.0" Diameter	24.0" Diameter
10'	16 ton	18 ton	21 ton	24 ton	31 ton
15'	24 ton	27 ton	31 ton	35 ton	47 ton
20'	31 ton	37 ton	42 ton	47 ton	63 ton
25'	39 ton	46 ton	52 ton	59 ton	79 ton
30'	47 ton	55 ton	63 ton	71 ton	94 ton
35'	55 ton	64 ton	73 ton	82 ton	110 ton
40'	63 ton	73 ton	84 ton	94 ton	126 ton

*Embedment depth into firm naturally deposited soils below the poor bearing "uncontrolled fill" soils.

Footings with a potential exposure to frost must bear a minimum of 36.0 inches below final exterior grade (or per local building code frost depth). Interior footers can bear at nominal depth although we recommend that at least 4.0 inches of aggregate or soil separate the floor slab and top of footing.

Footings should be concreted the day they are excavated to reduce the time that the soils are exposed to the elements. Backfilling should be accomplished as soon as possible for the same reason.

6.3 Below Grade Walls

The following lateral earth pressure parameters have been estimated for use in design of earth retention systems that may be required for the project:

DESIGN PARAMETER	SOIL DESCRIPTION		
	Silty Clay/ Clayey Silt	Sand/ Silty Sand	Washed #57 Aggregate
Total Unit Weight, γ (PCF)	135	125	105
Internal friction angle, ϕ	15°	30°	40°
Active Pressure Coefficient, K_a	0.600	0.333	0.217
At Rest Pressure Coefficient, K_o	0.750	0.500	0.357
Passive Pressure Coefficient, K_p	1.670	3.000	4.598
Cohesion, c (PSF)	1000	0	0
Coefficient of (Sliding) Friction, f	0.237	0.364	Not Applicable

6.4 Seismic Site Class

According to the subsoil profile revealed by the exploratory borings and other data available to us, this site can be categorized into Seismic Site Class D.

6.5 Slabs-on-Grade and Pavements

The recommendations presented in subsection 6.1 Site Preparation and Earthwork of this report are expected to result in subgrades capable of providing adequate support for properly designed and built at-grade features such as slabs, pavements, sidewalks, etc. We recommend that concrete slab and asphalt pavement designs include at least 4.0 and 6.0 inches, respectively, of premium aggregate base to provide for uniform distribution of live loads onto the compacted subgrade.

For pavement and slab thickness design, we recommend using presumptive California Bearing Ratio (CBR) value = 8 for flexible (asphalt) pavements and presumptive modulus of subgrade reaction (k_s) of not more than 230 pounds per cubic inch for rigid (concrete) pavements and slabs. We offer the follow pavement structures for your consideration:

Light Duty: 4.0-inches asphalt / 6.0-inches 304 crushed aggregate

Medium Duty: 5.5-inches asphalt / 6.0-inches 304 crushed aggregate

Heavy Duty: 7.0-inches asphalt / 8.0-inches 304 crushed aggregate

6.6 Temporary Excavations

Contractors working on the site must be made aware that excavation protection systems must observe the rules specified in local, state, or federal safety regulations; e.g., OSHA Health and Safety Standards for Excavations, 29 CFR Part 1926 or successor regulations. Such regulations are strictly enforced and, if not followed, the owner or the contractors could be liable for substantial penalties.

Construction site safety generally is the sole responsibility of the contractor. The contractor shall also be solely responsible for the means, methods, techniques, sequences, and operations of the proposed construction. Under no circumstances is Summit Testing & Inspection assuming responsibility for construction site safety or the contractor's activities; such responsibility is not implied and should not be inferred.

7.0 FIELD OBSERVATION

Field observation comprises the second phase of a complete geotechnical engineering service, permitting those who developed the report to observe site excavation and thereby assess the reliability of their subsurface profile and the appropriateness of their preliminary recommendations. Actual conditions often differ from those expected, and that situation can create serious problems unless a qualified individual is available to decide what to do about them, where and when they are found. Decisions such as these are "judgment calls," and the quality of judgment can have a profound impact on the project's bottom line.

The geotechnical engineers of record are most qualified to make effective judgment calls, because they are the individuals who are most familiar with the report and its original findings and preliminary recommendations. Further, the geotechnical engineer of record is in the best position to respond quickly to unanticipated conditions that are encountered.

8.0 GENERAL CONSIDERATIONS AND LIMITATIONS

The scope of our exploration and this report are based on our understanding of the proposed project as described herein. Should any of this information change, we must be notified and asked to review our conclusions and recommendations to insure their continuing validity in light of the changes.

In preparing this report, we had to assume that subsurface conditions between and away from individual sampling locations and depths are similar to those described herein. If construction reveals subsoil characteristics that differ, we must be asked to evaluate the differences be allowed to modify our report as we deem necessary. Conclusions about this site drawn by others from the data presented herein are strictly their responsibility.


8.1 Standard of Care

Summit Testing & Inspection Company has endeavored to provide its services in a manner that is consistent with appropriate professional practice and the level of care and skill ordinarily exercised by members of the profession currently practicing in this locality, at the same time, and under similar conditions as this project. No other representation, expressed or implied, is included or intended in this document.

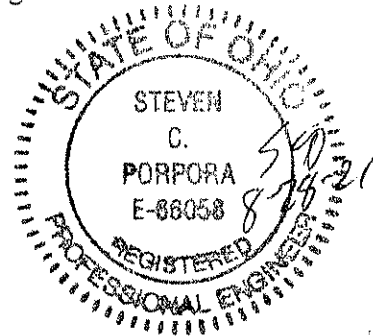
Respectfully submitted,

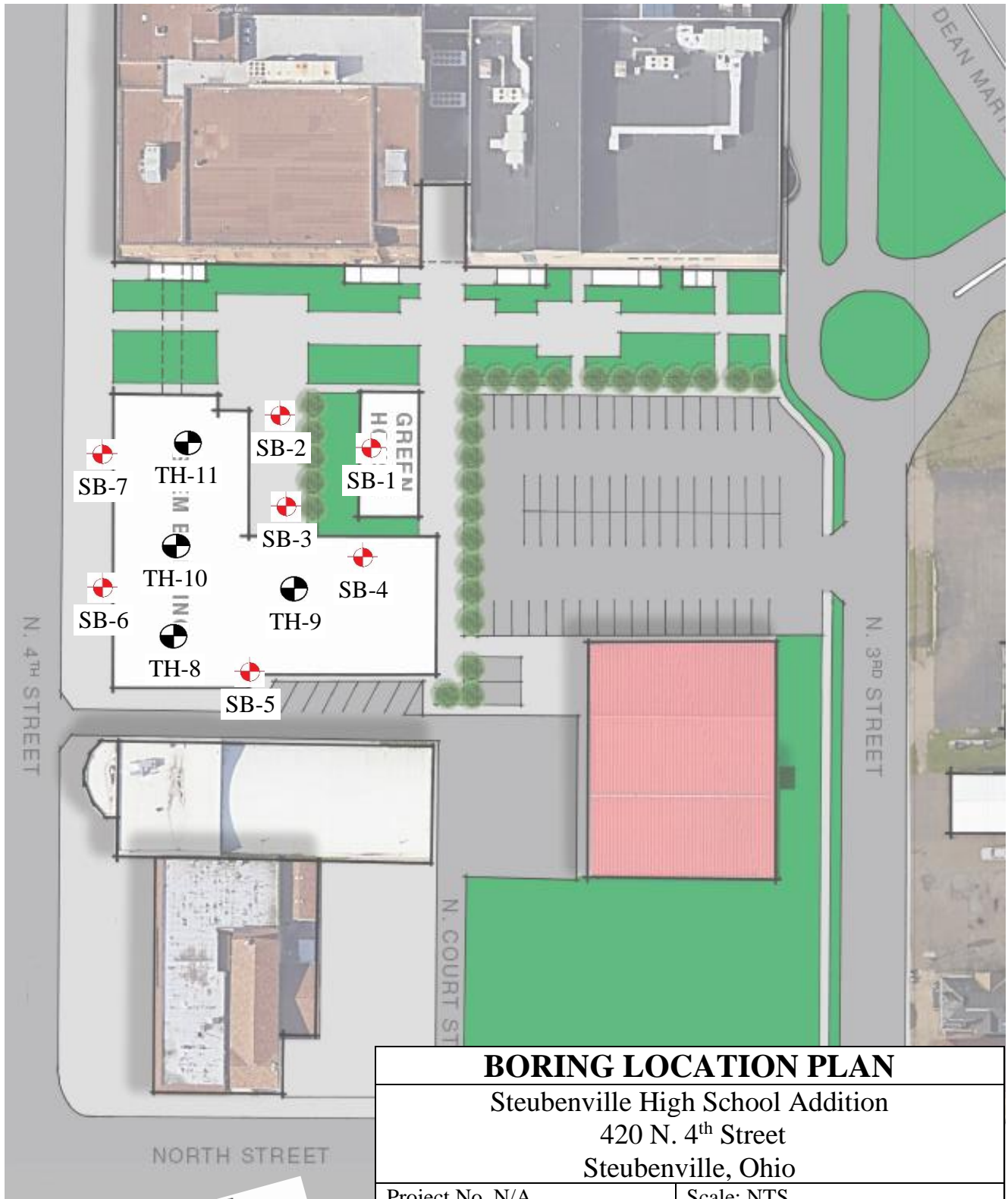
SUMMIT TESTING & INSPECTION COMPANY


Kevin M. Freese, E.I.T., M.S.C.E.


Steven C. Porpora, P.E., M.S.C.E.
Reviewing Engineer

PC: FILE





BORING LOCATION PLAN	
Steubenville High School Addition 420 N. 4 th Street Steubenville, Ohio	
Project No. N/A	Scale: NTS
Drawn By: K.F.	Date: 08-28-2021
SUMMIT TESTING & INSPECTION COMPANY 910 WHITE POND DRIVE, AKRON, OHIO 44320 PHONE (330) 869-6606 FAX (330) 869-6437	



BORING LOCATION PLAN	
Steubenville High School Addition 420 N. 4 th Street Steubenville, Ohio	
Project No. N/A	Scale: NTS
Drawn By: K.F.	Date: 08-28-2021
SUMMIT TESTING & INSPECTION COMPANY 910 WHITE POND DRIVE, AKRON, OHIO 44320 PHONE (330) 869-6606 FAX (330) 869-6437	





Summit Testing and Inspection Company

P.O. Box 2231, Akron, Ohio 44309
 910 White Pond Drive, Akron, Ohio 44320
 Phone: (330) 869-6606; Fax: (330) 869-6437
 www.summittesting.com

Boring No. **SB-1**
 Sheet 1 of 1
 Date 7/27/2021

SUBSURFACE EXPLORATION LOG

Job Title: Steubenville High School Addition Job No.: G21-11825
 Location: 332 North 4th Street, Steubenville, Ohio
 Ground Elevation: 704.54' Depth to seepage: 18.5' Depth to collapse: 13.0' Depth to water: None
 Drilling Contractor: Ridgeway Drilling, Inc. Drill: Truck D-50 Driller: P. Posedly Logger: K. Freese
 Hammer weight: 140 lbs Hammer drop: 30" Sampler Size: 2.0" O.D. Auger Size: 2.25" I.D.

Depth in feet	"N" value	Sample type Graphic log	Description of Material	Sample Recovery (Inches)	Water Content (%)	Liquid Limit (%)	Plasticity Index (%)	Unconfined Compressive Strength (TSF)	Remarks
0			5" ASPHALT 12+" SLAG AGGREGATE BASE						
1									* Drove rock.
2	4		FILL: Very loose black fine to coarse SILTY SAND some slag, moist	5*					
3									
4	3		FILL: Very loose brown fine grain SILTY SAND, some brick fragments, wet	8*					* Drove brick.
5									
6	6		Loose brown fine to coarse grain SILTY SAND & GRAVEL, moist	18					
7									
8									
9	11		Medium dense brown fine to coarse grain SAND & GRAVEL, little silt, moist	18					
10									
11									
12									
13									
14	17		Medium dense brown fine to coarse grain SAND & GRAVEL, moist	18					
15									
16									
17									
18									
19	10		Loose brown coarse grain SAND, some gravel, wet	18					Wet seep at 18.5 feet deep.
20									
21									
22									
23									
24	12		Medium dense brown fine to coarse grain SAND & GRAVEL, wet	18					
25			Boring terminated at 25ft						



Summit Testing and Inspection Company

P.O. Box 2231, Akron, Ohio 44309
 910 White Pond Drive, Akron, Ohio 44320
 Phone: (330) 869-6606; Fax: (330) 869-6437
 www.summittesting.com

Boring No. **SB-2**
 Sheet 1 of 1
 Date 7/27/2021

SUBSURFACE EXPLORATION LOG

Job Title: Steubenville High School Addition Job No.: G21-11825
 Location: 332 North 4th Street, Steubenville, Ohio
 Ground Elevation: 705.18' Depth to seepage: 14.0' Depth to collapse: 16.0' Depth to water: None
 Drilling Contractor: Ridgeway Drilling, Inc. Drill: Truck D-50 Driller: P. Posedly Logger: K. Freese
 Hammer weight: 140 lbs Hammer drop: 30" Sampler Size: 2.0" O.D. Auger Size: 2.25" I.D.

Depth in feet	"N" value	Sample type Graphic log	Description of Material	Sample Recovery (Inches)	Water Content (%)	Liquid Limit (%)	Plasticity Index (%)	Unconfined Compressive Strength (TSF)	Remarks
0			5" ASPHALT over 12" SLAG AGGREGATE BASE						
1									
2	8		FILL: Medium stiff brown CLAYEY SILT, some gravel and sand, moist	18				1.0	
3									
4	9		Loose brown medium to coarse grain SAND & GRAVEL, moist	14					
5									
6									
7	9			16					
8									
9	17		Medium dense brown fine to coarse grain SILTY SAND & GRAVEL, moist	18					
10									
11									
12									
13									
14	9		Loose brown medium to coarse grain SAND & GRAVEL, little silt, wet	18					Wet seep at 14.0 feet deep.
15									
16									
17									
18									
19	9			18					
20									
21									
22									
23									
24	6			18					
25			Boring terminated at 25ft						



Summit Testing and Inspection Company

P.O. Box 2231, Akron, Ohio 44309
 910 White Pond Drive, Akron, Ohio 44320
 Phone: (216) 869-6606; Fax: (216) 869-6437
 www.summittesting.com

Boring No. **SB-3**
 Sheet 2 of 2
 Date 7/27/2021

SUBSURFACE EXPLORATION LOG

Job Title: Steubenville High School Addition

Job No.: G21-11825

Depth in feet	"N" value	Sample type Graphic log	Description of Material	Sample Recovery (Inches)	Water Content (%)	Liquid Limit (%)	Plasticity Index (%)	Unconfined Compressive Strength (TSF)	Remarks
28									
29	26		Medium dense brown fine to coarse SAND & GRAVEL, little silt, wet	18					
30									
31									
32									
33									
34	26		Medium dense brown fine to coarse grain SILTY SAND & GRAVEL, moist	18					
35									
36									
37									
38									
39	55		Very dense brown fine to coarse SAND & GRAVEL, little silt, moist	18					
40									
41									
42									
43									
44	57		Very dense brown fine to coarse grain SAND & GRAVEL, moist	18					
45									
46									
47									
48									
49	51			18					
50			Boring terminated at 50ft						



Summit Testing and Inspection Company

P.O. Box 2231, Akron, Ohio 44309
 910 White Pond Drive, Akron, Ohio 44320
 Phone: (330) 869-6606; Fax: (330) 869-6437
 www.summittesting.com

Boring No. **SB-4**
 Sheet 1 of 1
 Date 7/27/2021

SUBSURFACE EXPLORATION LOG

Job Title: Steubenville High School Addition Job No.: G21-11825
 Location: 332 North 4th Street, Steubenville, Ohio
 Ground Elevation: 705.60' Depth to seepage: 14.0' Depth to collapse: 12.0' Depth to water: None
 Drilling Contractor: Ridgeway Drilling, Inc. Drill: Truck D-50 Driller: P. Posedly Logger: K. Freese
 Hammer weight: 140 lbs Hammer drop: 30" Sampler Size: 2.0" O.D. Auger Size: 2.25" I.D.

Depth in feet	"N" value	Sample type Graphic log	Description of Material	Sample Recovery (Inches)	Water Content (%)	Liquid Limit (%)	Plasticity Index (%)	Unconfined Compressive Strength (TSF)	Remarks
0			6" ASPHALT over 6" GRANULAR BASE						
1			FILL: Loose brown SANDY SILT, little rock and brick fragments, moist	8*					* Drove rock.
2	6								
3									
4	15		Medium dense to loose brown fine to coarse grain SILTY SAND & GRAVEL, moist	18					
5									
6									* Drove rock.
7	8			6*					
8									
9	19		Medium dense brown fine to coarse grain SAND & GRAVEL, little silt, moist	18					
10									
11									
12									
13									
14	11		Medium dense brown fine to coarse grain SAND & GRAVEL with random wet sandy silt seams, moist	16					Wet seep at 14.0 feet deep.
15									
16									
17									
18									
19	3		Very loose brown coarse grain SAND, wet	18					
20									
21									
22									
23									
24	17		Medium dense brown fine to coarse grain SILTY SAND & GRAVEL, trace coal, moist	18					
25			Boring terminated at 25ft						



Summit Testing and Inspection Company

P.O. Box 2231, Akron, Ohio 44309
 910 White Pond Drive, Akron, Ohio 44320
 Phone: (330) 869-6606; Fax: (330) 869-6437
 www.summittesting.com

Boring No. **SB-5**
 Sheet 1 of 1
 Date 7/27/2021

SUBSURFACE EXPLORATION LOG

Job Title: Steubenville High School Addition Job No.: G21-11825
 Location: 332 North 4th Street, Steubenville, Ohio
 Ground Elevation: 707.10' Depth to seepage: 19.0' Depth to collapse: 13.0' Depth to water: None
 Drilling Contractor: Ridgeway Drilling, Inc. Drill: Truck D-50 Driller: P. Posedly Logger: K. Freese
 Hammer weight: 140 lbs Hammer drop: 30" Sampler Size: 2.0" O.D. Auger Size: 2.25" I.D.

Depth in feet	"N" value	Sample type Graphic log	Description of Material	Sample Recovery (Inches)	Water Content (%)	Liquid Limit (%)	Plasticity Index (%)	Unconfined Compressive Strength (TSF)	Remarks
0			18" TOPSOIL						
1	4			21					
2			FILL: Very loose brown SANDY SILT, trace roots, moist						
3									
4	12		Loose to medium dense brown medium to coarse grain SAND & GRAVEL, moist	4*					* Drove rock.
5									
6									
7	5			14					
8									
9	15			18					
10									
11									
12									
13									
14	15			18					
15									
16									
17									
18									
19	12		Medium dense fine to coarse grain SAND & GRAVEL with wet coarse grain sand seam, moist	18					Wet seep at 19.0 feet deep in coarse grain sand seam.
20									
21									
22									
23									
24	11		Medium dense brown coarse grain SAND & GRAVEL, wet	18					
25			Boring terminated at 25ft						



Summit Testing and Inspection Company

P.O. Box 2231, Akron, Ohio 44309
 910 White Pond Drive, Akron, Ohio 44320
 Phone: (330) 869-6606; Fax: (330) 869-6437
 www.summittesting.com

Boring No. **SB-6**
 Sheet 1 of 1
 Date 7/27/2021

SUBSURFACE EXPLORATION LOG

Job Title: Steubenville High School Addition Job No.: G21-11825
 Location: 332 North 4th Street, Steubenville, Ohio
 Ground Elevation: 708.10' Depth to seepage: 14.0' Depth to collapse: 12.0' Depth to water: None
 Drilling Contractor: Ridgeway Drilling, Inc. Drill: Truck D-50 Driller: P. Posedly Logger: K. Freese
 Hammer weight: 140 lbs Hammer drop: 30" Sampler Size: 2.0" O.D. Auger Size: 2.25" I.D.

Depth in feet	"N" value	Sample type Graphic log	Description of Material	Sample Recovery (Inches)	Water Content (%)	Liquid Limit (%)	Plasticity Index (%)	Unconfined Compressive Strength (TSF)	Remarks
0			7" TOPSOIL						* Drove rock.
1	6		FILL: Loose black fine to medium grain SILTY SAND, little slag, moist	9*					
2									
3									
4	4		Very loose to medium dense brown fine to coarse grain SAND & GRAVEL, trace silt, moist	16					
5									
6									
7	12			17					
8									
9	9			18					
10									
11									
12									
13									
14	14		Medium dense brown fine to coarse grain SILTY SAND & GRAVEL, wet	18					Wet seep at 14.0 feet deep.
15									
16									
17									
18									
19	9		Loose to medium dense brown coarse grain SAND, some gravel, wet to moist	18					
20									
21									
22									
23									
24	17			18					
25			Boring terminated at 25ft						



Summit Testing and Inspection Company

P.O. Box 2231, Akron, Ohio 44309
 910 White Pond Drive, Akron, Ohio 44320
 Phone: (330) 869-6606; Fax: (330) 869-6437
 www.summittesting.com

Boring No. **SB-7**
 Sheet 1 of 1
 Date 7/27/2021

SUBSURFACE EXPLORATION LOG

Job Title: Steubenville High School Addition Job No.: G21-11825
 Location: 332 North 4th Street, Steubenville, Ohio
 Ground Elevation: 707.59' Depth to seepage: 13.5' Depth to collapse: 12.0' Depth to water: None
 Drilling Contractor: Ridgeway Drilling, Inc. Drill: Truck D-50 Driller: P. Posedly Logger: K. Freese
 Hammer weight: 140 lbs Hammer drop: 30" Sampler Size: 2.0" O.D. Auger Size: 2.25" I.D.

Depth in feet	"N" value	Sample type Graphic log	Description of Material	Sample Recovery (Inches)	Water Content (%)	Liquid Limit (%)	Plasticity Index (%)	Unconfined Compressive Strength (TSF)	Remarks
0			6" TOPSOIL						
1	6		FILL: Loose brown SANDY SILT, little gravel, trace brick, moist	16					
2									
3									
4	9		Loose to medium dense brown fine to coarse grain SAND & GRAVEL, little silt, moist	18					
5									
6									
7	9			17					
8									
9	16			18					
10									
11									
12									
13									
14	9		Loose brown fine grain SILTY SAND, saturated	18					Saturated sand at 13.5 feet deep.
15									
16									
17									
18									
19	8		Loose brown coarse grain SAND & GRAVEL, wet	18					
20									
21									
22									
23									
24	16		Medium dense brown fine to coarse grain SAND & GRAVEL, little silt, moist	18					
25			Boring terminated at 25ft						











KEY TO SYMBOLS

Symbol Description



Symbol Description

Strata symbols

Soil Samplers

	Paving		Standard penetration test
	Fill		
	Silty sand and gravel		
	Poorly graded sand and gravel		
	Poorly graded sand		
	Variable sand and silt mix		
	Poorly graded clayey silty sand		
	Topsoil		
	Silty sand		

Misc. Symbols

	Water table during drilling
	Depth to caving

Notes:

1. Exploratory borings were drilled on July 27, 2021 using a truck-mounted drill rig with a 6-inch diameter continuous flight power auger.
2. Boring locations were by Hasenstab Architects and field marked by Summit Summit Testing & Inspection personnel based on existing surface landmarks. Some borings were slightly offset to avoid to overhead and underground utilities.
3. These logs are subject to the limitations, conclusions, and recommendations in this report.
4. Results of tests conducted on samples recovered are reported on the logs.

Steubenville City School District

SECTION 004113

BID FORM

Project Name: *Steubenville High School STEM Facility*
Steubenville High School

Subcontractor Name: _____

Having read and examined the Contract Documents, including without limitation the Drawings and Specifications, prepared by the Architect for the above-referenced Project, and the following Addenda:

Addendum Number	Date of Receipt
_____	_____
_____	_____
_____	_____
_____	_____

The undersigned Bidder proposes to perform all Work for the applicable Subcontract(s), in accordance with the Contract Documents, for the following sum(s):

Bid #1

Bid Package: SITEWORK

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #2

Bid Package: PAVING

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #3

Bid Package: CONCRETE

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #4

Bid Package: MASONRY

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #5

Bid Package: STRUCTURAL / MISC STEEL

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #6

Bid Package: GENERAL TRADES

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #7

Bid Package: METAL PANELS

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #8

Bid Package: TERRACOTTA PANELS

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #9

Bid Package: ROOFING

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #10

Bid Package: FRAMING / GWB / ACOUSTIC CEILINGS

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #11

Bid Package: GLASS & GLAZING

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #12

Bid Package: TILE

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #13

Bid Package: FLOORING

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #14

Bid Package: PAINTING

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #15

Bid Package: POLISHED CONCRETE

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #16

Bid Package: ELEVATORS

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #17

Bid Package: FIRE PROTECTION

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #18

Bid Package: PLUMBING

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #19

Bid Package: HVAC / CONTROLS

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

Bid #20

Bid Package: ELECTRICAL / COMMUNICATIONS

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

COMBINATION Bid Packages

List Bid Packages as part of Combination Bid Package:

Bid Package: COMBINATION

BASE BID FOR ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

ALTERNATES

ALTERNATE #1: Green House with all utilities and services

Circle one of the options- ADD DEDUCT

ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

ALTERNATE #2: Existing High School classroom development at end of new Sky Bridge.

Circle one of the options- ADD DEDUCT

ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

ALTERNATE #3: Provide composite metal panel wall panel system in lieu of exterior face brick at the single-story portion of the proposed facility and the at each of the two exit stair towers.

Circle one of the options- ADD DEDUCT

ALL LABOR AND MATERIALS, for the sum of \$ _____

Sum in words: _____

UNIT PRICES

Unsuitable Soils removal/replacement w/Soils

- Cost per 1 C/Y = \$ _____

Unsuitable Soils removal/replacement w/Granular

- Cost per 1 C/Y = \$ _____

Unsuitable Soils at Foundations removal off-site & replacement w/footer mix concrete

- Cost per 1 C/Y = \$ _____

BIDDER'S CERTIFICATION

The Bidder hereby acknowledges that the following representations in this Bid are material and not mere recitals:

1. The Bidder has read and understands the Contract Documents and agrees to comply with all requirements of the Contract Documents, regardless of whether the Bidder has actual knowledge of the requirements and regardless of any statement or omission made by the Bidder which might indicate a contrary intention.
2. The Bidder represents that the Bid is based upon the Basis of Design and Acceptable Components specified by the Contract Documents.
3. The Bidder acknowledges that all Work shall be completed in the Contract Time, and that each applicable portion of the Work shall be completed upon the respective Milestones, unless an extension of time is granted in accordance with the Contract Documents. The Bidder understands that the award of separate contracts for the Project will require sequential, coordinated, and interrelated operations, which may involve interference, disruption, hindrance, or delay in the progress of the Work. The Bidder agrees that the Contract Sum, as amended from time to time, shall cover all amounts due resulting from interference, disruption, hindrance, or delay caused by or between Subcontractors or their agents and employees. The Bidder agrees that any such interference, disruption, hindrance, or delay is within the contemplation of the Bidder and the Owner and that the Subcontractor's sole remedy from the Owner for any such interference, disruption, hindrance, or delay shall be an extension of time in accordance with the proposed Contract Documents.
4. The Bidder has visited the Site, become familiar with local conditions, and has correlated personal observations about the requirements of the proposed Contract Documents. The Bidder has no outstanding questions regarding the interpretation or clarification of the proposed Contract Documents.
5. During the performance of the Contract, the Bidder agrees to comply with Ohio Administrative Code ("OAC") Chapters 123:2-3 through 123:2-9 and agrees to incorporate the monthly reporting provisions of OAC Section 123:2-9-01 into all subcontracts on the Project, regardless of tier. The Bidder understands the State's Equal Opportunity Coordinator, or the Contracting Authority may conduct pre-award and post-award compliance reviews to determine if the Bidder maintains nondiscriminatory employment practices, maintains an affirmative action program, and is exerting good faith efforts to accomplish the goals of the affirmative action program. For a full statement of the rules regarding Equal Employment Opportunity in the Construction Industry, see OAC Chapters 123:2-1 through 123:2-9.
6. The Bidder certifies that upon the execution of the Contract Form, the Subcontractor shall be enrolled in good standing in the Ohio Bureau of Workers' Compensation ("OBWC") Drug-Free Workplace Program ("DFWP") or an OBWC-approved DFWP throughout the entire Project, in accordance with ORC Section 153.03- 153.031, including placement of its employees in a pool with a random drug testing rate of at least 5%. The Bidder acknowledges the responsibility to require all Subcontractors to be enrolled in good standing in the OBWC DFWP or an OBWC-approved DFWP that meets the requirements specified in ORC Section 153.03 - 153.031, including placement of its employees in a pool with a drug testing rate of at least 5%, prior to the Subcontractor providing labor at the Site.

7. The Bidder and each person signing on behalf of the Bidder certifies, and in the case of a Bid by a joint venture each member thereof certifies as to such member's entity, under penalty of perjury, that to the best of the undersigned's knowledge and belief: (a) the Base Bid, any Unit Prices and any Alternate bid in the Bid have been arrived at independently without collusion, consultation, communication or agreement, for the purpose of restricting competition as to any matter relating to such Base Bid, Unit Prices or Alternate bid with any other Bidder; (b) unless otherwise required by law, the Base Bid, any Unit Prices and any Alternate bid in the Bid have not been knowingly disclosed by the Bidder and shall not knowingly be disclosed by the Bidder prior to the bid opening, directly or indirectly, to any other Bidder who would have any interest in the Base Bid, Unit Prices or Alternate bid; (c) no attempt has been made or shall be made by the Bidder to induce any other Person to submit or not to submit a Bid for the purpose of restricting competition.

8. The Bidder acknowledges that, by signing the Bid Form on the Bidder Signature and Information Form on the following page, it is signing the actual Bid and when submitted as a part of its bid packages, shall serve as the Bidder's authorization for the further consideration and activity in the bidding and contract process.

9. The Bidder agrees to furnish the submittals required by the CMR for execution of the Subcontract Form within three (3) days of the date of the Notice of Intent to Award or within three (3) days of the post bid interview. The required submittals shall include but are not limited to Delinquent Personal Property Tax, Drug Free Safety Program Certification, Subcontractor/Material Supplier Form, EEO Certificate, BWC certification, Subcontract Agreement Form, and Schedule of Values.

10. Each Bid shall contain the name of every individual interested therein. If the Bidder is a corporation, partnership, sole proprietorship, or limited liability corporation, an officer, partner, or principal of the Bidder, as applicable, shall print or type the legal name of the Bidder on the line provided and sign the Bid Form. If the Bidder is a joint venture, an officer, partner, or principal, as applicable, of each member of the joint venture shall print or type the legal name of the applicable member on the line provided and sign the Bid Form. All signatures must be original.

BIDDER SIGNATURE AND INFORMATION

BIDDER'S NAME (PRINT): _____

Authorized Signature: _____

Title: _____

Company Name: _____

Mailing Address: _____

Telephone Number: (_____) _____ Facsimile Number (_____) _____

Where Incorporated: _____ Type of Business (circle one):

corporation partnership sole proprietorship limited liability corporation

Federal ID Number: _____

Contact person for
Contract processing: _____

Partnership or Joint Venture

BIDDER'S NAME (PRINT): _____

Authorized Signature: _____

Title: _____

Company Name: _____

Mailing Address: _____

Telephone Number: (____) _____ Facsimile Number (____) _____

Where Incorporated: _____ Type of Business (circle one):

Corporation partnership sole proprietorship limited liability corporation

Federal ID Number: _____

Contact person for

Contract processing: _____

END OF SECTION

SECTION 005000

CONTRACTING FORMS AND SUPPLEMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes the following forms and supplements:
 - 1. Section 050000a "Subcontract Agreement Form"
 - 2. Section 050000b "Certified Payroll Form"
 - 3. Section 050000c "Certification of Material Stored Off Site"
 - 4. Section 050000d "Certificate of Liability Insurance"
 - 5. Section 050000e "JSA Assessment Form"

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SUBCONTRACT AGREEMENT

THIS AGREEMENT made at Steubenville, Ohio, dated **[Date]**, by and between **[Subcontractor Company Name]** hereinafter called the subcontractor, and **Grae-Con Construction, Inc.** hereinafter called the contractor.

WITNESSETH:

That the subcontractor and the contractor for the consideration hereinafter named, agree as follows:

ARTICLE 1 - Scope of Work: The subcontractor shall **[Scope of Work]** to the satisfaction of the contractor, Architect, Engineer and Owner, for the project entitled **[Project Name]**, located at **[Project Address]**, as prepared by . for and shall do everything required by this Agreement, and the contract documents as hereinafter listed: (1) Plans; (2) Specifications; (3) Addenda, Modifications or Change Orders; (4) Contract Bond.

The above items and this Agreement form the contract between the contractor and subcontractor and are incorporated herein as fully a part of this contract as if hereto attached or herein repeated verbatim.

The subcontractor shall be bound to the contractor by the terms of this Agreement and the contract documents between the Owner and contractor and shall assume toward the contractor all of the obligations and responsibilities which the contractor, by those documents, assumes toward the Owner, provided that where any provision of the contract documents between the Owner and contractor is inconsistent with any provision of this Agreement, this Agreement shall govern.

ARTICLE 2: The subcontractor shall be solely responsible for obtaining the plans, specifications and other contract documents necessary for completion of this contract. No alterations shall be made in the work shown or described by the drawings and specifications, except when authorized by the contractor in writing.

ARTICLE 3: The subcontractor shall provide sufficient, safe, and proper working facilities at all times. He shall within twenty-four hours, after receiving written notice from the contractor, remove from the grounds or buildings, all materials condemned by the Architect or Engineer or the contractor, whether worked or unworked, and to take down all portions of the work which the Architect or Engineer or contractor, shall by like written notice condemn as unsound, improper, or as in any way failing to conform to the drawings and specifications.

ARTICLE 4: Should the subcontractor at any time refuse or fail to supply sufficient properly skilled workmen, or sufficient materials of proper quality, or fail in the performance of any of the covenants contained in the contract, the contractor shall give written notice to the subcontractor of such failure or refusal. If the subcontractor does not immediately remedy such failure, within two days after the receipt of the written notice, then the contractor may terminate the contract, and the subcontractor shall be liable to the contractor for any additional or excess costs occasioned the contractor by the failure of the subcontractor to perform. In case of such termination of the contract and discontinuance of the employment of the subcontractor, he shall not be entitled to receive any further payment under this contract.

ARTICLE 5: The subcontractor is to complete all work contemplated under this contract in accordance with the progress work schedules issued by the owner, Architect or contractor. Upon failure to have all work completed in accordance with said work schedule, the subcontractor shall be liable to the contractor for any additional or excess costs incurred by the contractor.

Should the subcontractor be obstructed or delayed in the prosecution of completion of his work by an act, neglect, delay or default of the owner, the Architect the Engineer of the contractor or because of non-availability of materials due to government controls during a period of National emergency, or any other subcontractor or contractor employed by the contractor or the owner upon the work, or by damages which may happen by fire, lightning, earthquake, or cyclone, or the abandonment of the work by the employees through no fault of the subcontractor, then the time herein fixed for the completion of the work shall be extended for a period of time equal to the time lost by reason an any or all of the causes aforesaid, but no set allowances shall be made unless a claim therefore is presented in writing to the contractor within seventy-two hours of the occurrence of such delay. The duration of such extension shall be certified by the contractor.

ARTICLE 6: The subcontractor expressly excuses and releases the contractor from liability for any and all delays and additional costs occasioned by improper work coordination, or work interference caused by the owner, contractor, or other subcontractor.

ARTICLE 7: The subcontractor shall cooperate with the contractor in scheduling and coordinating this work to avoid conflicts or interference with the work of others, and shall promptly submit any drawings, samples, or other documents required to the contractor so as not to cause delay in the progress of the work of any other party.

ARTICLE 8: The Contract Sum: It is hereby mutually agreed between the parties hereto that the contractor shall pay the subcontractor for the performance of the contract, subject to additions and deductions provided herein, as follows: **[Contract Amount (Written Dollar Amount)]**

Labor and material amounts as per base bid plus additions and / or deductions for alternates accepted, as follows: Amendments for additions, or deductions, from this contract may be made at any time; providing, however, that the subcontractor shall submit to the contractor in writing a full description of the work involved in the amendment, together with the amount to be added, or deducted, from the contract sum, and provided, further that such amendment will not be effective until approved by the contractor in writing.

ARTICLE 9: The contractor shall make progress payments on account of the contract as provided herein as follows:
On or about the 20th day of each month 90 percent of the value based on the contract prices, of labor and materials incorporated in the work and of materials suitable stored at the site thereof up to the 20th day of the previous month as estimated by the owner, less the aggregate of previous payments, will be paid to the subcontractor; provided however that the subcontractor's request for payment must be in the office of the contractor before the 25th day of each month.

ARTICLE 10: Final payment shall become due thirty (30) days after substantial completion of the project and after acceptance of the project by owner's agent and the contractor provided the contract has been fully performed. Before issuance of final payment, the subcontractor shall submit evidence satisfactory to the contractor and in accordance with the requirements of law, that all payrolls, material bills, and other indebtedness connected with this work has been paid in full. In addition, before issuance of final payment, the subcontractor shall furnish to the contractor, a complete release of liens and affidavits from himself and from all material suppliers, subcontractors, and unions (if Applicable). The subcontractor shall furnish a release of liens to the contractor in a form satisfactory to the contractor.

ARTICLE 11: It is further mutually agreed between the parties hereto, that no certificate of payment issued, except the final payment, shall be conclusive evidence of the performance of this contract, and no payment shall be construed as acceptance of defective work or improper materials. The acceptance of final payment shall constitute a waiver of all claims by the subcontractor except those previously made in writing to the contractor at the time of the final application for payment.

ARTICLE 12: If at any time there should be any evidence of any lien or claim for which, if established, the contractor or owner might become liable and which is chargeable to the subcontractor, the contractor shall have the right to retain out of any payment due or thereafter to become due, an amount sufficient to completely pay in full any such claim or lien. Should there be any such claim after all payments are made, the subcontractor shall refund to the contractor all monies that the later may be compelled to pay in discharging any lien or claim on said premises made in consequence of the subcontractor's default.

ARTICLE 13: The subcontractor shall indemnify and save harmless the contractor from all claims, demands, causes of action, or suits of whatsoever nature arising out of the services, labor and materials furnished by subcontractor or its subcontractors under this subcontract. The subcontractor shall immediately pay and discharge or shall provide security sufficient and satisfactory in itself to its laborers, material men, attorney fees, or other creditors, or those of its subcontractors, for payment of any obligation or alleged obligation, which it, or any of its subcontractors may have, in and of enforcement of which a lien or right of any kind is established, or is attempted to be established, on or against work or real property on which work is situated.

ARTICLE 14: Conditions of guarantee or warranty shall be as mentioned in the Specifications and Plans covering this contract; however, should there be any warranty or guarantee contained in said Plans or Specifications for which, if established, the contractor may be liable but which is chargeable to the subcontractor due to the subcontractor's work, supplies, or materials furnished, the subcontractor shall indemnify and hold harmless the contractor for any liability arising from said warranty or guarantee.

ARTICLE 15: The subcontractor warrants that all materials furnished and incorporated by him in the project shall be new, unless otherwise specified, and that this work under this subcontract shall be of good quality, free from faults and defects, and in conformance with the contract documents. Any work not conforming to these standards may be considered defective. This warranty shall be in addition to any other warranty or remedy allowed by law or the contract documents and not in limitation of any other warranty.

ARTICLE 16: The subcontractor shall, during the performance of this contract, maintain liability insurance in accordance with the specifications. In addition, the subcontractor shall comply and agree with the contractor's equal employment policy which is attached hereto as Exhibit "A" and shall comply and agree with the contractor's general safety requirements and guidelines which is attached hereto as Exhibit "B".

ARTICLE 17: The parties agree that should the prime contract between the owner and this contractor be terminated for convenience by the owner, this contractor's liability to the subcontractor shall be solely limited to payment for labor, materials, and work performed up to the date of such termination.

ARTICLE 18: All claims, disputes, and other matters in question arising out of, or related to, this agreement or the breach thereof, shall be decided by arbitration in accordance with the Construction Industry Arbitration Rules of the American arbitration Association then in force, unless the parties mutually agree otherwise. Notice of the demand for arbitration shall be filed in writing with the other party to this agreement and with the American arbitration Association within a reasonable time after the claim, dispute or other matter in question has arisen. The award rendered by the arbitrator shall be final, and judgment may be entered on it in any Court having jurisdiction thereof.

The subcontractor further agrees to consolidation of his claim or dispute with the claim of another person or entity involving a similar question of law or fact whose presence is needed for full and complete relief.

This agreement and the right of all parties hereunder shall be construed in accordance with the laws of the State of Ohio.

ARTICLE 19: This contract may not be assigned or subcontracted without the express written consent of the contractor.

ARTICLE 20: The said parties for themselves, their heirs, executors, administrators and assigns do hereby agree to full performance of the covenants herein contained.

IN WITNESS WHEREOF, the parties to these presents have hereunto set their hands the day and year first above written.

[Subcontractor Company Name]

Signed and acknowledged in the presence of

Subcontractor Witness

Grae-Con Witness

Typed or printed name and title

GRAE-CON CONSTRUCTION, INC.

Robert A. Gribben, III – Vice President

In order to comply with our employment policies, the recipient, upon receiving this order No. [Project #-Subcontractor #], hereby agrees to the following:

- 1) He will not discriminate against any employee or applicant for employment because of race, color, religion, national origin, ancestry or sex. he will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, national origin, ancestry or sex. Such action shall include, but is not limited to, the following: Employment, upgrading, demotion, or transfer; recruitment advertising, layoff or termination; rates of pay or other forms of compensation; and selection for training, including apprenticeship. He agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this non-discrimination clause.
- 2) He will, in all solicitations or advertisements for employees, state that all qualified applicants will receive consideration for employment without regard to race, color, religion, national origin, ancestry or sex.
- 3) He will send to each labor union or representative of workers with which he has a collective bargaining agreement or other contract or understanding, a notice, advising the labor union, or workers' representative of his commitments under Section 202 of the Director of department of Public Works' Rule and Regulation on Equal Employment opportunity (Hereinafter referred to as "DPW Regulation on EEO"), and shall post copies of the notice in conspicuous places available to employees and applicants for employment.
- 4) He will comply with all provisions of the DPW Regulation on EEO, and of the implementing rules, regulations and applicable orders of the State Equal Employment Opportunity Coordinator.
- 5) He agrees that he will full cooperate with the State Equal Opportunity Coordinator, with any other official or agency of the State or Federal Government which seeks to eliminate unlawful employment discrimination, and with all other State and Federal efforts to assure equal employment practices under this contract, and he shall comply promptly with all requests and directions from the State of Ohio or any of its officials and agencies in this regard, both before and during performance.
- 6) Full cooperation as expressed in clause five (5), above, shall include, but not be limited to, being a witness and permitting employees to be witnesses and complainants in any proceeding involving questions of unlawful employment practices, furnishing all information and reports required by the DPW Regulation on, and by the rules, regulations, and orders of the State Equal Employment Opportunity Coordinator pursuant thereto, and permitting access to his books, records, and accounts by the Contracting agency and the State Equal Opportunity Coordinator for purposes of investigation to ascertain compliance with such rules, regulations, and orders.
- 7) In the event of his noncompliance with the non-discrimination clauses of this contract or with any of such rules, regulations, or order, this contract may be canceled, terminated, or suspended in whole or in part and he may be declared ineligible for further State Contracts in accordance with procedures authorized in the DPW Regulation on EEO, and such other sanctions may be imposed and remedies instituted as provided in said Regulation or by rule, regulation, or order of the State Equal Employment Opportunity Coordinator, or as otherwise provided by law.

In the event this contract is terminated for a material breach of said Regulation, he shall become liable for any and all damages which shall accrue to the State of Ohio as a result of said breach.

8) He agrees to the following procedure: The contractor will take such action with respect to any subcontract or purchase order as the Contracting Agency may direct as a means of enforcing the provisions of Paragraphs (1) through (8) including sanctions for noncompliance: provided, however, that in the event the contractor becomes involved in, or is threatened with, litigation with a subcontractor, vendor, or other party as a result of such direction by the contracting agency, the contractor may request the State of Ohio to enter into such litigation to protect the interest of the State.

GRAE-CON CONSTRUCTION, INC.

Robert A. Gribben, Jr.
President



General Safety Requirements

In the construction industry, a company's key asset is its employees. We at Grae-Con are very much aware of our key asset, and are making a commitment to our employees to provide a safe and healthy work place. In order to achieve this goal, we are initiating the following General Safety Requirements. It is to the benefit of all involved that these requirements be properly observed.

We ask that any employee who observes an unsafe act or condition notify the person performing the unsafe act and report it to the project superintendent or immediate supervisor so corrective actions can be made. It is our goal to eliminate all accidents in the work place.

Safety is to be foremost in all employee actions at all times. Grae-Con lives by the motto of "*Safety Always*" and we want to ensure all employees follow this standard.

We would like to welcome you to our company and we hope to ensure that your employment with us will be a safe, productive, and enjoyable experience.

Think Safety Always,

Robert A. Gribben, Jr. – *President*

Robert A. Gribben, III – *Vice President & Safety Committee Chairman*



General Safety Guidelines

All employees, subcontractors, and visitors are to work in strict accordance with the Grae-Con Corporate Health & Safety Program and the OSHA 29 CFR 1926 and/or 1910 standards. When Grae-Con is employed by a company who also has a written safety program, all employees and subcontractors are required to obey and adhere to their program as well.

Safety is to be foremost in everyone's actions at all times. Grae-Con lives by the motto of "Safety Always" and we want to ensure everyone follows this standard. Employee and subcontractor cooperation in the following requirements are mandatory and not limited to these requirements alone.

General Safety Rules

1. No alcoholic beverages or controlled substances are permitted on the jobsite at any time. Any violation of this will result in immediate dismissal from the jobsite, and immediate termination of the employee.
2. No radios of any kind are permitted on the jobsite.
3. No horseplay will be tolerated on the jobsite.

Worksite Analysis/Safety Meetings

A daily Safety Task Analysis (STA) will be completed by each crew and signed off on daily to ensure all safety guidelines are followed for that task and no incidents occurred. Also, a Safety "Tool Box" Talk will be held weekly, and will be attended by everyone on the job site.

Personal Protective Equipment

All employees will be issued appropriate safety and protective equipment, however all equipment will remain the property of Grae-Con. Any employee who destroys or alters safety devices or equipment will be subject to disciplinary procedures. If any safety devices are defective, immediate notification to the project superintendent is required.

1. Hard hats are to be worn at all times while in the confines of the work area.
2. Safety glasses are to be worn at all times while working in the confines of the work area.
3. Steel toed, leather work boots are required to be worn at all times while on the job site. Tennis or jogging shoes are not permitted on the job site at any time.

Protective devices and other personal protective apparel such as welding shields, burning goggles, safety harnesses, and life lines shall be worn where required for protection of employees by the nature of the work or by the conditions under which it is performed.

1. During welding procedures, a welding hood and appropriate apparel are mandatory.
2. When burning, burning goggles, face shield, and appropriate apparel are mandatory.
3. When cutting, sandblasting, or grinding, a face shield and safety glasses are mandatory.

Scaffolds / Handrails / Barricades

All scaffolds shall be built in a safe and proper manner and meet requirements of all OSHA regulations.

All floor openings and elevated walking and working surfaces are to be provided with proper barricades and handrails as per OSHA requirements

Hazardous Materials

Right to Know Act is followed on all Grae-Con jobsites. All Material Safety Data Sheet reports are made available through the project superintendent.

Confined Space / Hazardous Work Areas

For complete safety in extreme hazardous areas such as storage tanks, excavations, valve pits, etc., no employee shall be permitted to work alone or unattended. Appropriate oxygen deficiency tests shall be made prior to employee entering pits, tanks, etc.

Moving Equipment

Only authorized personnel shall operate Grae-Con equipment. These employees shall be qualified in the use and operation of the equipment. No one but the operator shall ride on or in any equipment while it is in use. Any defective equipment must be reported immediately to the project superintendent. That defective equipment is not to be used by any employee.

Overhead Work

When overhead work is to be performed, the area below shall be roped off, and the traffic needs to be directed around the construction area safely by signs or other appropriate means.

No material shall be thrown or dropped from any overhead levels until all necessary safety precautions have been taken to protect persons at ground level. Also, employees are not to leave any material, tools, or equipment unsecured where overhead work is involved.

Excavations

Temporary railings or barricades are required to safeguard workers or other persons from falling into any excavation areas. Any necessary sheeting, shoring, or bracing in the excavation is to be installed under the direction of the project superintendent for safe operation.

Tool Maintenance and Care

All electrical tools are to be in proper operating condition and provided with proper ground fault protection devices when in use. Electrical cords are to be in good condition and properly ground. All air compressor hoses must be properly secured. Inform the project superintendent if any provided tools are defective or in bad condition.

Housekeeping

In order to assure jobsite safety, good housekeeping shall be observed at all times. The jobsite shall be kept clean and orderly at all times under the direction of the project superintendent.

1. Employees shall use and cooperate in keeping toilet facilities in a clean and sanitary condition.
2. Materials shall be stacked or stored where they will not interfere with construction or create hazards. Locations of stacks or storage shall be approved by the project superintendent.
3. All employees will assist in the elimination of unsecured materials overhead, on scaffolds, stairways, etc.
4. All employees must dispose of all scrap and waste materials properly and as directed by the project superintendent.
5. A safe and unobstructed access shall be maintained at all times for emergency use.

Disciplinary Actions

Employees who disregard, willfully violate, or repeatedly violate safety rules and requirements are subject to disciplinary procedures. Any violation of Grae-Con Safety Requirements will be dealt with as follows:

1. FIRST OFFENSE – Employee will be given a verbal warning.
2. SECOND OFFENSE – Employee will be given a written notice.
3. THIRD OFFENSE – Employee will be terminated from employment.

Accidents / Incidents

All employees will cooperate in the elimination of unsafe conditions or work habits to minimize work related injuries. All accidents are to be reported immediately to your superintendent. If the accident warrants medical care, the project superintendent is to assign an employee to take the injured worker to the nearest hospital or arrange for ambulance service.



Supplemental Instructions

Contract Execution

Please sign and return both copies of the enclosed agreement to our office. We will sign and return the original to you for your files. No payments shall be made on any subcontract until this agreement is fully executed by both parties.

Certificate of General Liability and Workers Compensation

Copies of current workmen's compensation certificates and approved copies of certificate of liability insurance, with the required coverages, are required to be on record in our office during the entire length of the contract. General Liability Insurance Certificates must name Grae-Con as additional insured. No payments will be made toward your contract until these documents are received in our office.

Release of Liens of Major Vendors, Subcontractors, & Labor Unions

Release of Liens will need to be provided from all subcontractors, vendors, and labor unions prior to the release of monthly and final payment per the forms attached. Please provide a list of major subcontractors and vendors prior to the start of work. Lead times for major material items will also need to be provided on this list.

Submittals

Please submit two (2) copies of shop drawings to this office for approval as soon as possible and any samples furnished must be supplied in triplicate. There will be absolutely no excuse for work delays if submittals are late or have not been submitted within a timely manner. Please ensure that your submittals are in and allow time for your delivery lead times to meet the project schedule and 10 days for review by architect/engineer.

Certified Payroll

- Certified Payroll is required for this project and must be submitted with each pay application.
- Certified Payroll is not required for this project.

Hazardous Materials

Please submit MSDS on all material delivered to this jobsite.

Applications for Payment / Schedule of Values / CPM Schedule Durations

An approved Schedule of Values and Schedule Durations must be provided to our office before billing can be completed. The detail of the breakdown will be discussed to ensure compliance with the owner's requirements.

Pencil Copies need to be faxed or emailed to the PM only by the 20th of the month. Invoices need to be prepared on an AIA G702 form or a comparable form. If comments are not made within 48 hours please process your hard copies and be in our office no later than the 25th of the month. You will be reminded at all coordination meetings of when pay apps will be due.

Change Order Work Procedures

Time & Material (T&M)

All extra work order (EWO) sheets must be signed and cost coded by our project superintendent. Once the work is completed it needs to be figured and itemized with all the attached delivery tickets, invoices, and time sheets. It then needs to be sent in to the project manager as a Change Order Request (COR) so it can be sent in for approval.

Request For Proposal (RFP)

Provide pricing with Labor Cost (with Total Manhours), Material Cost, and overhead and profit breakdowns. All pricing is to be sent to the Project Manager, not the on-site Superintendent. Please reference the RFP # on your letter or transmittal.

Extra Work Payment Procedures

NO PAYMENT WILL BE MADE FROM SEPARATE INVOICES. A change order will be issued from our office. Once it is signed and returned you will be able to bill against it accordingly on your application for payment.

Contract Closeout Procedures

All closeout documents will be required before any retainage is released. A mandatory closeout meeting will be held prior to substantial completion to ensure that all obligations are met. Closeout requirements are not subject to dispute.

All orders are subject to cancellation if proper procedures and delivery schedules are not adhered to.



P.O. Box 1778, 880 Kingsdale Road
Steubenville, Ohio 43952
Phone: (740) 282-6830
Fax: (740) 282-6849

SUBCONTRACT AGREEMENT
No. Project #-Subcontract #

TO: Subcontractor Company Name
Address

DATE: Date of Contract

PHONE: Phone Number
FAX: Fax Number

PROJECT: Project Name

WORK AT:
Project Address

BILL TO:
Grae-Con Construction, Inc.
P.O. Box 1778, 880 Kingsdale Rd
Steubenville, Ohio 43952

DESCRIPTION:
Subcontractor Scope of Work

Description	Amount
Scope of Work	Contract Amount

Total Contract Amount

Grae Con Construction Inc

Subcontractor Company Name

(Authorized Signature)

(Authorized Signature)

By: Project Manager

By: _____

Date: Date of Contract

Date: _____

022712

WAIVER OF MECHANIC'S LIEN
Subcontractor Partial Payment Release

KNOW ALL MEN BY THESE PRESENTS, that _____
_____ (“Subcontractor”) in accordance with the terms of a certain
Contract (the “Contract”) dated _____ with Grae-Con Construction, Inc. (“Grae-Con”),
has provided certain labor, equipment, supplies, materials and/or workmanship in connection with the
development and construction of improvements to real property owned by
_____ (the “Owner”) located at _____
_____.

NOW, THEREFORE, upon the actual receipt by Subcontractor of payment from Grae-Con in the
sum of \$_____, which sum represents the full amount due Subcontractor by Grae-Con as of _____
_____ (“Release Date”) less and except that retention in the amount of \$_____ being withheld by Grae-Con under and pursuant to the terms of the Contract, Subcontractor does hereby:

1. Certify to Grae-Con and Owner that all persons, firms, associations, corporations, or other entities furnishing labor, equipment, supplies, materials and/or workmanship to Subcontractor or Owner with respect to the Contract have been paid in full as of the Release Date, including any and all applicable federal, state, and local sales, use, excise or similar taxes; and,
2. Release and waive any mechanic’s liens and all manner of liens, whatsoever, which Subcontractor, its successors or assigns may have upon any portion of the lands of Owner or the buildings or improvements situated thereon, or any personal or intangible property of Owner, for labor, equipment, supplies, materials and/or workmanship furnished under the Contract, as of the Release Date; and,
3. Release and forever discharge Grae-Con and Owner, their successors and assigns of and from any and all manner of claims, demands, and causes of action whatsoever against Grae-Con and Owner which Subcontractor, its successors and assigns may have for, upon or by reason of any matter, cause or thing whatsoever arising under or out of the Contract, as the Release Date; and,
4. Agrees to indemnify and hold harmless Grae-Con and Owner, their successors and assigns, against all loss, cost, damage or expense by reason of any mechanic’s lien and all manner of liens, claims or demands which anyone may have for labor performed, or for equipment, supplies, materials and/or workmanship furnished under the Contract as of Release Date.

IN WITNESS WHEREOF, Subcontractor has caused these presents to be executed this _____ day of _____, 20____.

Name of Subcontractor
By: _____
Print Name: _____
Title: _____

Sworn to and subscribed in my presence
this _____ day of _____, 20____.

Notary Public

022712

WAIVER OF MECHANIC'S LIEN
Subcontractor Labor Union Release

KNOW ALL MEN BY THESE PRESENTS, that _____
_____ (“Subcontractor”) is signatory to a Labor Union Agreement with
_____, Local No. _____
 (“Union”). Subcontractor in accordance with the terms of a certain Contract (the “Contract”) dated _____
_____ with Grae-Con Construction, Inc. (“Grae-Con”), has provided certain labor and/or
workmanship using employees, who are members of the Union, in connection with the development and
construction of improvements to real property owned by _____
(the “Owner”) located at _____.

NOW, THEREFORE, in consideration of the payment by Subcontractor of all Union benefits payable by the Subcontractor to the Union for those Union employees of the Subcontractor, who provided certain labor and/or workmanship in connection with the above referenced construction project as of _____ (“Release Date”), the Union does hereby:

1. Certify to Grae-Con and Owner that all Union benefits due by Subcontractor for those Union employees, who provided labor and/or workmanship to Subcontractor with respect to the above referenced project, have been paid in full as of the Release Date; and,

2. Release and waive any mechanic’s liens and all manner of liens, whatsoever, which Union, its successors or assigns may have upon any portion of the lands of Owner or the buildings or improvements situated thereon, or any personal or intangible property of Owner, for labor and/or workmanship furnished by members of the Union, as of the Release Date; and,

3. Release and forever discharge Grae-Con and Owner, their successors and assigns of and from any and all manner of claims, demands, and causes of action whatsoever against Grae-Con and Owner which Union, its successors and assigns may have for, upon or by reason of any matter, cause or thing whatsoever arising under or out of the labor and/or workmanship provided by members of the Union on the above referenced project, as the Release Date.

IN WITNESS WHEREOF, Union has caused these presents to be executed this _____ day of _____, 20____.

Name of Labor Union

Local No.

By: _____

Print Name: _____

Title: _____

Sworn to and subscribed in my presence
this _____ day of _____, 20____.

Notary Public

022712

WAIVER OF MECHANIC’S LIEN
Subcontractor Vendor Release

KNOW ALL MEN BY THESE PRESENTS, that _____ (“Subcontractor”) in accordance with the terms of a certain Contract (the “Contract”) dated _____ with Grae-Con Construction, Inc. (“Grae-Con”), has purchased certain equipment, supplies and/or materials from Vendor, which were used by Subcontractor for the development and construction of improvements to the real property owned by _____ (the “Owner”) located at _____.

NOW, THEREFORE, in consideration for the payment by Subcontractor of all sums due Vendor for equipment, supplies and/or materials by Vendor to Subcontractor in connection with the above referenced construction project as of _____ (“Release Date”), the Vendor does hereby:

1. Certify to Grae-Con and Owner that all sums due by Subcontractor to Vendor for equipment, supplies and/or materials provided by Vendor with respect to the above referenced project, have been paid in full as of the Release Date; and,
2. Release and waive any mechanic’s liens and all manner of liens, whatsoever, which Vendor, its successors or assigns may have upon any portion of the lands of Owner or the buildings or improvements situated thereon, or any personal or intangible property of Owner, for equipment, supplies and/or materials furnished or provided by Vendor to Subcontractor in connection with the above reference construction project, as of the Release Date; and,
3. Release and forever discharge Grae-Con and Owner, their successors and assigns of and from any and all manner of claims, demands, and causes of action whatsoever against Grae-Con and Owner which Vendor, its successors and assigns may have for, upon or by reason of any matter, cause or thing whatsoever arising under or out of equipment, supplies and/or materials provided by Vendor to Subcontractor with reference to the above referenced construction project, as of the Release Date.

IN WITNESS WHEREOF, Union has caused these presents to be executed this _____ day of _____, 20____.

Name of Vendor

By: _____

Print Name: _____

Title: _____

Sworn to and subscribed in my presence
this _____ day of _____, 20____.

Notary Public

022712

WAIVER OF MECHANIC'S LIEN
Subcontractor Final Payment Release

KNOW ALL MEN BY THESE PRESENTS, that _____
_____ (“Subcontractor”) in accordance with the terms of a certain
Contract (the “Contract”) dated _____ with Grae-Con Construction, Inc. (“Grae-Con”),
has provided certain labor, equipment, supplies, materials and/or workmanship in connection with the
development and construction of improvements to real property owned by
_____ (the “Owner”) located at _____
_____.

NOW, THEREFORE, upon the actual receipt by Subcontractor of payment from Grae-Con in the
sum of \$ _____, which sum represents the full amount due Subcontractor by Grae-Con pursuant to
the terms of the Contract, Subcontractor does hereby:

1. Certify to Grae-Con and Owner that all persons, firms, associations, corporations, or other entities
furnishing labor, equipment, supplies, materials and/or workmanship to Subcontractor or Owner with respect
to the Contract have been paid in full, including any and all applicable federal, state, and local sales, use,
excise or similar taxes; and,
2. Release and waive any mechanic’s liens and all manner of liens, whatsoever, which
Subcontractor, its successors or assigns may have upon any portion of the lands of Owner or the buildings or
improvements situated thereon, or any personal or intangible property of Owner, for labor, equipment,
supplies, materials and/or workmanship furnished under the Contract; and,
3. Release and forever discharge Grae-Con and Owner, their successors and assigns of and from any
and all manner of claims, demands, and causes of action whatsoever against Grae-Con and Owner which
Subcontractor, its successors and assigns may have for, upon or by reason of any matter, cause or thing
whatsoever arising under or out of the Contract; and,
4. Agrees to indemnify and hold harmless Grae-Con and Owner, their successors and assigns,
against all loss, cost, damage or expense by reason of any mechanic’s lien and all manner of liens, claims or
demands which anyone may have for labor performed, or for equipment, supplies, materials and/or
workmanship furnished under the Contract.

IN WITNESS WHEREOF, Subcontractor has caused these presents to be executed this _ day of _____, 20____.

Name of Subcontractor
By: _____
Print Name: _____
Title: _____

Sworn to and subscribed in my presence
this ____ day of _____, 20____.

Notary Public

CERTIFIED PAYROLL REPORT

Employer Name & Address			Name of General / Prime Contractor			Project Name & Location					Contracting Public Authority										
Check if subcontractor <input type="checkbox"/>			Week Ending			Payroll #					Project Number										
						Page _____ Of _____															
1. Employee Name, Address and Social Security Number	2. Work Class	3. Hours Worked - Day & Date							4. Project Total Hrs.	5. Base Rate	6. Project Gross	7. Fringes:					8. Total Hours All Jobs	9. Total Gross All Jobs	10. Taxes Withheld	11. Other Deducts	12. NET Paid
												Cash <input type="checkbox"/>	Approved Plans <input type="checkbox"/>	Cash & Approved Plans <input type="checkbox"/>	H&W	Pens					
		OT																			
		ST																			
		OT																			
		ST																			
		OT																			
		ST																			
		OT																			
		ST																			
		OT																			
		ST																			
		OT																			
		ST																			

Date _____ My signature on this form signifies that I pay, or supervise the payment of the employees shown above. I am certifying: 1) That during the pay period reported on this form, all hours worked on this project have been paid at the appropriate prevailing wage rate for the class of work done. 2) That the fringe benefits have been paid as indicated above. 3) That no rebates or deductions have been or will be made, directly or indirectly from the total wages earned, other than permissible deductions as defined in the Ohio Revised Code Chapter 4115. 4) That apprentices are registered with the U.S. Department of Labor, Bureau of Apprenticeship and Training. The willful falsification of any of the above statements may subject the contractor or subcontractor to civil or criminal prosecution.

Name and Title _____

Signature _____

Certification of Material Stored Off Site

Sheet ___ of ___



Contract No.: _____ **Contract Type** _____

Line Item Reference No.	Invoice No.	Pay App. No.	Material Supplier	Description (Material Supplied)	Previous Stored Amount	New Materials Stored (Add)	Mat. Installed This Period (Deduct)	Total Materials Stored off Site

Totals \$ -

The undersigned have visited, inspected and approved the place for storage of the fabricated materials for which the Contractor is requesting payment. The fabricated materials are in conformity with the Specifications and have been tagged with the Project name and number for delivery to the Project.

Less 8% Retainage \$ -

Total Stored off Site \$ -

 Architect Date

 Contractor Date

 Construction Manager Date



CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY)

05/13/2022

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER 	CONTACT NAME:	
	PHONE (A/C, No, Ext):	FAX (A/C, No):
	E-MAIL ADDRESS:	
	INSURER(S) AFFORDING COVERAGE	
	INSURER A : Insurance Company Name	
	INSURER B :	
INSURER C :		
INSURER D :		
INSURER E :		
INSURER F :		
INSURER NAIC #		

INSURED
XYZ Construction LLC
 123 Main Street
 OH

COVERAGES **CERTIFICATE NUMBER:** **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	<input checked="" type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input checked="" type="checkbox"/> PRO-JECT <input type="checkbox"/> LOC OTHER:	X		XXXXXXXX	01/01/2022	01/01/2023	EACH OCCURRENCE	\$ 1,000,000
							DAMAGE TO RENTED PREMISES (Ea occurrence)	\$ 100,000
							MED EXP (Any one person)	\$ 5,000
							PERSONAL & ADV INJURY	\$ 1,000,000
							GENERAL AGGREGATE	\$ 2,000,000
							PRODUCTS - COMP/OP AGG	\$ 2,000,000
								\$
A	<input checked="" type="checkbox"/> AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO OWNED AUTOS ONLY <input checked="" type="checkbox"/> HIRED AUTOS ONLY <input type="checkbox"/> SCHEDULED AUTOS <input checked="" type="checkbox"/> NON-OWNED AUTOS ONLY	X		XXXXXXX	01/01/2022	01/01/2023	COMBINED SINGLE LIMIT (Ea accident)	\$ 1,000,000
							BODILY INJURY (Per person)	\$
							BODILY INJURY (Per accident)	\$
							PROPERTY DAMAGE (Per accident)	\$
								\$
A	<input checked="" type="checkbox"/> UMBRELLA LIAB <input checked="" type="checkbox"/> OCCUR <input checked="" type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS-MADE <input checked="" type="checkbox"/> DED <input type="checkbox"/> RETENTION \$ 0	X		XXXXXXX	01/01/2022	01/01/2023	EACH OCCURRENCE	\$ 5,000,000
							AGGREGATE	\$ 5,000,000
								\$
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) <input type="checkbox"/> Y/N If yes, describe under DESCRIPTION OF OPERATIONS below		N/A	XXXXXXXX	01/01/2022	01/01/2022	<input checked="" type="checkbox"/> PER STATUTE <input checked="" type="checkbox"/> OTH-ER	
							E.L. EACH ACCIDENT	\$ 1,000,000
							E.L. DISEASE - EA EMPLOYEE	\$ 1,000,000
							E.L. DISEASE - POLICY LIMIT	\$ 1,000,000
A	Builders Risk/Inst			XXXXXXX	01/01/2022	01/01/2023	Limit	Contract Amt

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

As respects General Liability, Grae-Con Construction, Inc. is named as additional insured in regard to Steubenville City Schools STEM Project.

CERTIFICATE HOLDER Grae-Con Construction, Inc. PO Box 1778 880 Kingsdale Road Steubenville, OH 43952	CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.
	AUTHORIZED REPRESENTATIVE



AIA® Document A201® – 2017

General Conditions of the Contract for Construction

for the following PROJECT:

(Name and location or address)

Steubenville High School STEM Building
420 N. 4th Street
Steubenville, Ohio 43952

THE OWNER:

(Name, legal status and address)

Steubenville City Schools
611 N. 4th Street
Steubenville, Ohio 43952

THE ARCHITECT:

(Name, legal status and address)

Hasenstab Architects, Inc.
190 N. Union Street
Suite 400
Akron, OH 44304

TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
- 2 OWNER
- 3 CONTRACTOR
- 4 ARCHITECT
- 5 SUBCONTRACTORS
- 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS
- 7 CHANGES IN THE WORK
- 8 TIME
- 9 PAYMENTS AND COMPLETION
- 10 PROTECTION OF PERSONS AND PROPERTY
- 11 INSURANCE AND BONDS
- 12 UNCOVERING AND CORRECTION OF WORK
- 13 MISCELLANEOUS PROVISIONS

ADDITIONS AND DELETIONS:

The author of this document has added information needed for its completion. The author may also have revised the text of the original AIA standard form. An *Additions and Deletions Report* that notes added information as well as revisions to the standard form text is available from the author and should be reviewed. A vertical line in the left margin of this document indicates where the author has added necessary information and where the author has added to or deleted from the original AIA text.

This document has important legal consequences. Consultation with an attorney is encouraged with respect to its completion or modification.

For guidance in modifying this document to include supplementary conditions, see AIA Document A503™, Guide for Supplementary Conditions.

Init.

/

14 TERMINATION OR SUSPENSION OF THE CONTRACT

15 CLAIMS AND DISPUTES



Init.

/

INDEX

(Topics and numbers in bold are Section headings.)

Acceptance of Nonconforming Work

9.6.6, 9.9.3, **12.3**

Acceptance of Work

9.6.6, 9.8.2, 9.9.3, 9.10.1, 9.10.3, 12.3

Access to Work

3.16, 6.2.1, 12.1

Accident Prevention

10

Acts and Omissions

3.2, 3.3.2, 3.12.8, 3.18, 4.2.3, 8.3.1, 9.5.1, 10.2.5,

10.2.8, 13.3.2, 14.1, 15.1.2, 15.2

Addenda

1.1.1

Additional Costs, Claims for

3.7.4, 3.7.5, 10.3.2, 15.1.5

Additional Inspections and Testing

9.4.2, 9.8.3, 12.2.1, **13.4**

Additional Time, Claims for

3.2.4, 3.7.4, 3.7.5, 3.10.2, 8.3.2, **15.1.6**

Administration of the Contract

3.1.3, **4.2**, 9.4, 9.5

Advertisement or Invitation to Bid

1.1.1

Aesthetic Effect

4.2.13

Allowances

3.8

Applications for Payment

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5.1, 9.5.4, 9.6.3, 9.7, 9.10

Approvals

2.1.1, 2.3.1, 2.5, 3.1.3, 3.10.2, 3.12.8, 3.12.9,

3.12.10.1, 4.2.7, 9.3.2, 13.4.1

Arbitration

8.3.1, 15.3.2, **15.4**

ARCHITECT

4

Architect, Definition of

4.1.1

Architect, Extent of Authority

2.5, 3.12.7, 4.1.2, 4.2, 5.2, 6.3, 7.1.2, 7.3.4, 7.4, 9.2,
9.3.1, 9.4, 9.5, 9.6.3, 9.8, 9.10.1, 9.10.3, 12.1, 12.2.1,
13.4.1, 13.4.2, 14.2.2, 14.2.4, 15.1.4, 15.2.1

Architect, Limitations of Authority and Responsibility

2.1.1, 3.12.4, 3.12.8, 3.12.10, 4.1.2, 4.2.1, 4.2.2, 4.2.3,
4.2.6, 4.2.7, 4.2.10, 4.2.12, 4.2.13, 5.2.1, 7.4, 9.4.2,
9.5.4, 9.6.4, 15.1.4, 15.2

Architect's Additional Services and Expenses

2.5, 12.2.1, 13.4.2, 13.4.3, 14.2.4

Architect's Administration of the Contract

3.1.3, 3.7.4, 15.2, 9.4.1, 9.5

Architect's Approvals

2.5, 3.1.3, 3.5, 3.10.2, 4.2.7

Architect's Authority to Reject Work

3.5, 4.2.6, 12.1.2, 12.2.1

Architect's Copyright

1.1.7, 1.5

Architect's Decisions

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 4.2.14, 6.3,
7.3.4, 7.3.9, 8.1.3, 8.3.1, 9.2, 9.4.1, 9.5, 9.8.4, 9.9.1,
13.4.2, 15.2

Architect's Inspections

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.8.3, 9.9.2, 9.10.1, 13.4

Architect's Instructions

3.2.4, 3.3.1, 4.2.6, 4.2.7, 13.4.2

Architect's Interpretations

4.2.11, 4.2.12

Architect's Project Representative

4.2.10

Architect's Relationship with Contractor

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2,
3.5, 3.7.4, 3.7.5, 3.9.2, 3.9.3, 3.10, 3.11, 3.12, 3.16,
3.18, 4.1.2, 4.2, 5.2, 6.2.2, 7, 8.3.1, 9.2, 9.3, 9.4, 9.5,
9.7, 9.8, 9.9, 10.2.6, 10.3, 11.3, 12, 13.3.2, 13.4, 15.2

Architect's Relationship with Subcontractors

1.1.2, 4.2.3, 4.2.4, 4.2.6, 9.6.3, 9.6.4, 11.3

Architect's Representations

9.4.2, 9.5.1, 9.10.1

Architect's Site Visits

3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4

Asbestos

10.3.1

Attorneys' Fees

3.18.1, 9.6.8, 9.10.2, 10.3.3

Award of Separate Contracts

6.1.1, 6.1.2

Award of Subcontracts and Other Contracts for Portions of the Work

5.2

Basic Definitions

1.1

Bidding Requirements

1.1.1

Binding Dispute Resolution

8.3.1, 9.7, 11.5, 13.1, 15.1.2, 15.1.3, 15.2.1, 15.2.5,
15.2.6.1, 15.3.1, 15.3.2, 15.3.3, 15.4.1

Bonds, Lien

7.3.4.4, 9.6.8, 9.10.2, 9.10.3

Bonds, Performance, and Payment

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**, 11.1.3, **11.5**

Building Information Models Use and Reliance

1.8

Building Permit

3.7.1

Capitalization

1.3

Certificate of Substantial Completion

9.8.3, 9.8.4, 9.8.5

Init.

/

Certificates for Payment

4.2.1, 4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4, 15.1.4

Certificates of Inspection, Testing or Approval
13.4.4

Certificates of Insurance
9.10.2

Change Orders

1.1.1, 3.4.2, 3.7.4, 3.8.2.3, 3.11, 3.12.8, 4.2.8, 5.2.3, 7.1.2, 7.1.3, **7.2**, 7.3.2, 7.3.7, 7.3.9, 7.3.10, 8.3.1, 9.3.1.1, 9.10.3, 10.3.2, 11.2, 11.5, 12.1.2

Change Orders, Definition of

7.2.1

CHANGES IN THE WORK

2.2.2, 3.11, 4.2.8, **7**, 7.2.1, 7.3.1, 7.4, 8.3.1, 9.3.1.1, 11.5

Claims, Definition of

15.1.1

Claims, Notice of
1.6.2, 15.1.3

CLAIMS AND DISPUTES

3.2.4, 6.1.1, 6.3, 7.3.9, 9.3.3, 9.10.4, 10.3.3, **15**, 15.4
Claims and Timely Assertion of Claims

15.4.1

Claims for Additional Cost

3.2.4, 3.3.1, 3.7.4, 7.3.9, 9.5.2, 10.2.5, 10.3.2, **15.1.5**

Claims for Additional Time

3.2.4, 3.3.1, 3.7.4, 6.1.1, 8.3.2, 9.5.2, 10.3.2, **15.1.6**

Concealed or Unknown Conditions, Claims for

3.7.4

Claims for Damages
3.2.4, 3.18, 8.3.3, 9.5.1, 9.6.7, 10.2.5, 10.3.3, 11.3, 11.3.2, 14.2.4, 15.1.7

Claims Subject to Arbitration
15.4.1

Cleaning Up

3.15, 6.3

Commencement of the Work, Conditions Relating to
2.2.1, 3.2.2, 3.4.1, 3.7.1, 3.10.1, 3.12.6, 5.2.1, 5.2.3, 6.2.2, 8.1.2, 8.2.2, 8.3.1, 11.1, 11.2, **15.1.5**

Commencement of the Work, Definition of

8.1.2

Communications

3.9.1, **4.2.4**
Completion, Conditions Relating to
3.4.1, 3.11, 3.15, 4.2.2, 4.2.9, 8.2, 9.4.2, 9.8, 9.9.1, 9.10, 12.2, 14.1.2, 15.1.2

COMPLETION, PAYMENTS AND

9

Completion, Substantial
3.10.1, 4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, 9.8, 9.9.1, 9.10.3, 12.2, 15.1.2
Compliance with Laws
2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14.1.1, 14.2.1.3, 15.2.8, 15.4.2, 15.4.3

Concealed or Unknown Conditions

3.7.4, 4.2.8, 8.3.1, 10.3

Conditions of the Contract

1.1.1, 6.1.1, 6.1.4

Consent, Written

3.4.2, 3.14.2, 4.1.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3, 13.2, 15.4.4.2

Consolidation or Joinder

15.4.4

CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

1.1.4, **6**

Construction Change Directive, Definition of

7.3.1

Construction Change Directives

1.1.1, 3.4.2, 3.11, 3.12.8, 4.2.8, 7.1.1, 7.1.2, 7.1.3, **7.3**, 9.3.1.1

Construction Schedules, Contractor's

3.10, 3.11, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2

Contingent Assignment of Subcontracts

5.4, 14.2.2.2

Continuing Contract Performance

15.1.4

Contract, Definition of

1.1.2

CONTRACT, TERMINATION OR SUSPENSION OF THE

5.4.1.1, 5.4.2, 11.5, **14**

Contract Administration

3.1.3, 4, 9.4, 9.5

Contract Award and Execution, Conditions Relating to

3.7.1, 3.10, 5.2, 6.1

Contract Documents, Copies Furnished and Use of
1.5.2, 2.3.6, 5.3

Contract Documents, Definition of

1.1.1

Contract Sum

2.2.2, 2.2.4, 3.7.4, 3.7.5, 3.8, 3.10.2, 5.2.3, 7.3, 7.4, **9.1**, 9.2, 9.4.2, 9.5.1.4, 9.6.7, 9.7, 10.3.2, 11.5, 12.1.2, 12.3, 14.2.4, 14.3.2, 15.1.4.2, **15.1.5**, **15.2.5**

Contract Sum, Definition of

9.1

Contract Time

1.1.4, 2.2.1, 2.2.2, 3.7.4, 3.7.5, 3.10.2, 5.2.3, 6.1.5, 7.2.1.3, 7.3.1, 7.3.5, 7.3.6, 7, 7.3.10, 7.4, 8.1.1, 8.2.1, 8.2.3, 8.3.1, 9.5.1, 9.7, 10.3.2, 12.1.1, 12.1.2, 14.3.2, 15.1.4.2, 15.1.6.1, 15.2.5

Contract Time, Definition of

8.1.1

CONTRACTOR

3

Contractor, Definition of

3.1, **6.1.2**

Contractor's Construction and Submittal Schedules

3.10, 3.12.1, 3.12.2, 4.2.3, 6.1.3, 15.1.6.2

Init.

/

Contractor's Employees
2.2.4, 3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2,
10.3, 11.3, 14.1, 14.2.1.1

Contractor's Liability Insurance

11.1

Contractor's Relationship with Separate Contractors
and Owner's Forces

3.12.5, 3.14.2, 4.2.4, 6, 11.3, 12.2.4

Contractor's Relationship with Subcontractors

1.2.2, 2.2.4, 3.3.2, 3.18.1, 3.18.2, 4.2.4, 5, 9.6.2, 9.6.7,
9.10.2, 11.2, 11.3, 11.4

Contractor's Relationship with the Architect

1.1.2, 1.5, 2.3.3, 3.1.3, 3.2.2, 3.2.3, 3.2.4, 3.3.1, 3.4.2,
3.5.1, 3.7.4, 3.10, 3.11, 3.12, 3.16, 3.18, 4.2, 5.2, 6.2.2,
7, 8.3.1, 9.2, 9.3, 9.4, 9.5, 9.7, 9.8, 9.9, 10.2.6, 10.3,
11.3, 12, 13.4, 15.1.3, 15.2.1

Contractor's Representations

3.2.1, 3.2.2, 3.5, 3.12.6, 6.2.2, 8.2.1, 9.3.3, 9.8.2

Contractor's Responsibility for Those Performing the
Work

3.3.2, 3.18, 5.3, 6.1.3, 6.2, 9.5.1, 10.2.8

Contractor's Review of Contract Documents

3.2

Contractor's Right to Stop the Work

2.2.2, 9.7

Contractor's Right to Terminate the Contract

14.1

Contractor's Submittals

3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 9.2, 9.3, 9.8.2,
9.8.3, 9.9.1, 9.10.2, 9.10.3

Contractor's Superintendent

3.9, 10.2.6

Contractor's Supervision and Construction

Procedures

1.2.2, 3.3, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3,
7.3.4, 7.3.6, 8.2, 10, 12, 14, 15.1.4

Coordination and Correlation

1.2, 3.2.1, 3.3.1, 3.10, 3.12.6, 6.1.3, 6.2.1

Copies Furnished of Drawings and Specifications

1.5, 2.3.6, 3.11

Copyrights

1.5, **3.17**

Correction of Work

2.5, 3.7.3, 9.4.2, 9.8.2, 9.8.3, 9.9.1, 12.1.2, **12.2**, 12.3,
15.1.3.1, 15.1.3.2, 15.2.1

Correlation and Intent of the Contract Documents

1.2

Cost, Definition of

7.3.4

Costs

2.5, 3.2.4, 3.7.3, 3.8.2, 3.15.2, 5.4.2, 6.1.1, 6.2.3,
7.3.3.3, 7.3.4, 7.3.8, 7.3.9, 9.10.2, 10.3.2, 10.3.6, 11.2,
12.1.2, 12.2.1, 12.2.4, 13.4, 14

Cutting and Patching

3.14, 6.2.5

Damage to Construction of Owner or Separate
Contractors

3.14.2, 6.2.4, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damage to the Work

3.14.2, 9.9.1, 10.2.1.2, 10.2.5, 10.4, 12.2.4

Damages, Claims for

3.2.4, 3.18, 6.1.1, 8.3.3, 9.5.1, 9.6.7, 10.3.3, 11.3.2,
11.3, 14.2.4, 15.1.7

Damages for Delay

6.2.3, 8.3.3, 9.5.1.6, 9.7, 10.3.2, 14.3.2

Date of Commencement of the Work, Definition of

8.1.2

Date of Substantial Completion, Definition of

8.1.3

Day, Definition of

8.1.4

Decisions of the Architect

3.7.4, 4.2.6, 4.2.7, 4.2.11, 4.2.12, 4.2.13, 6.3, 7.3.4,
7.3.9, 8.1.3, 8.3.1, 9.2, 9.4, 9.5.1, 9.8.4, 9.9.1, 13.4.2,
14.2.2, 14.2.4, 15.1, 15.2

Decisions to Withhold Certification

9.4.1, **9.5**, 9.7, 14.1.1.3

Defective or Nonconforming Work, Acceptance,
Rejection and Correction of

2.5, 3.5, 4.2.6, 6.2.3, 9.5.1, 9.5.3, 9.6.6, 9.8.2, 9.9.3,
9.10.4, 12.2.1

Definitions

1.1, 2.1.1, 3.1.1, 3.5, 3.12.1, 3.12.2, 3.12.3, 4.1.1, 5.1,
6.1.2, 7.2.1, 7.3.1, 8.1, 9.1, 9.8.1, 15.1.1

Delays and Extensions of Time

3.2, **3.7.4**, 5.2.3, 7.2.1, 7.3.1, **7.4**, **8.3**, 9.5.1, **9.7**,
10.3.2, **10.4**, 14.3.2, **15.1.6**, 15.2.5

Digital Data Use and Transmission

1.7

Disputes

6.3, 7.3.9, 15.1, 15.2

Documents and Samples at the Site

3.11

Drawings, Definition of

1.1.5

Drawings and Specifications, Use and Ownership of

3.11

Effective Date of Insurance

8.2.2

Emergencies

10.4, 14.1.1.2, **15.1.5**

Employees, Contractor's

3.3.2, 3.4.3, 3.8.1, 3.9, 3.18.2, 4.2.3, 4.2.6, 10.2,
10.3.3, 11.3, 14.1, 14.2.1.1

Equipment, Labor, or Materials

1.1.3, 1.1.6, 3.4, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,
4.2.6, 4.2.7, 5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3,
9.10.2, 10.2.1, 10.2.4, 14.2.1.1, 14.2.1.2

Execution and Progress of the Work

1.1.3, 1.2.1, 1.2.2, 2.3.4, 2.3.6, 3.1, 3.3.1, 3.4.1, 3.7.1,
3.10.1, 3.12, 3.14, 4.2, 6.2.2, 7.1.3, 7.3.6, 8.2, 9.5.1,
9.9.1, 10.2, 10.3, 12.1, 12.2, 14.2, 14.3.1, 15.1.4

Extensions of Time
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3, 7.4, 9.5.1, 9.7, 10.3.2,
10.4, 14.3, 15.1.6, **15.2.5**

Failure of Payment

9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

Faulty Work

(See Defective or Nonconforming Work)

Final Completion and Final Payment

4.2.1, 4.2.9, 9.8.2, **9.10**, 12.3, 14.2.4, 14.4.3

Financial Arrangements, Owner's

2.2.1, 13.2.2, 14.1.1.4

GENERAL PROVISIONS

1

Governing Law

13.1

Guarantees (See Warranty)

Hazardous Materials and Substances

10.2.4, **10.3**

Identification of Subcontractors and Suppliers

5.2.1

Indemnification

3.17, **3.18**, 9.6.8, 9.10.2, 10.3.3, 11.3

Information and Services Required of the Owner

2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10.1, 6.1.3, 6.1.4, 6.2.5,

9.6.1, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2,

14.1.1.4, 14.1.4, 15.1.4

Initial Decision

15.2

Initial Decision Maker, Definition of

1.1.8

Initial Decision Maker, Decisions

14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

Initial Decision Maker, Extent of Authority

14.2.4, 15.1.4.2, 15.2.1, 15.2.2, 15.2.3, 15.2.4, 15.2.5

Injury or Damage to Person or Property

10.2.8, 10.4

Inspections

3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,

9.9.2, 9.10.1, 12.2.1, 13.4

Instructions to Bidders

1.1.1

Instructions to the Contractor

3.2.4, 3.3.1, 3.8.1, 5.2.1, 7, 8.2.2, 12, 13.4.2

Instruments of Service, Definition of

1.1.7

Insurance

6.1.1, 7.3.4, 8.2.2, 9.3.2, 9.8.4, 9.9.1, 9.10.2, 10.2.5, **11**

Insurance, Notice of Cancellation or Expiration

11.1.4, 11.2.3

Insurance, Contractor's Liability

11.1

Insurance, Effective Date of

8.2.2, 14.4.2

Insurance, Owner's Liability

11.2

Insurance, Property

10.2.5, 11.2, 11.4, 11.5

Insurance, Stored Materials

9.3.2

INSURANCE AND BONDS

11

Insurance Companies, Consent to Partial Occupancy

9.9.1

Insured loss, Adjustment and Settlement of

11.5

Intent of the Contract Documents

1.2.1, 4.2.7, 4.2.12, 4.2.13

Interest

13.5

Interpretation

1.1.8, 1.2.3, **1.4**, 4.1.1, 5.1, 6.1.2, 15.1.1

Interpretations, Written

4.2.11, 4.2.12

Judgment on Final Award

15.4.2

Labor and Materials, Equipment

1.1.3, 1.1.6, **3.4**, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,

5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2, 10.2.1,

10.2.4, 14.2.1.1, 14.2.1.2

Labor Disputes

8.3.1

Laws and Regulations

1.5, 2.3.2, 3.2.3, 3.2.4, 3.6, 3.7, 3.12.10, 3.13, 9.6.4,

9.9.1, 10.2.2, 13.1, 13.3.1, 13.4.2, 13.5, 14, 15.2.8,

15.4

Liens

2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

Limitations, Statutes of

12.2.5, 15.1.2, 15.4.1.1

Limitations of Liability

3.2.2, 3.5, 3.12.10, 3.12.10.1, 3.17, 3.18.1, 4.2.6,

4.2.7, 6.2.2, 9.4.2, 9.6.4, 9.6.7, 9.6.8, 10.2.5, 10.3.3,

11.3, 12.2.5, 13.3.1

Limitations of Time

2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2.7,

5.2, 5.3, 5.4.1, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3,

9.4.1, 9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15,

15.1.2, 15.1.3, 15.1.5

Materials, Hazardous

10.2.4, **10.3**

Materials, Labor, Equipment and

1.1.3, 1.1.6, 3.4.1, 3.5, 3.8.2, 3.8.3, 3.12, 3.13, 3.15.1,

5.2.1, 6.2.1, 7.3.4, 9.3.2, 9.3.3, 9.5.1.3, 9.10.2,

10.2.1.2, 10.2.4, 14.2.1.1, 14.2.1.2

Means, Methods, Techniques, Sequences and

Procedures of Construction

3.3.1, 3.12.10, 4.2.2, 4.2.7, 9.4.2

Mechanic's Lien

2.1.2, 9.3.1, 9.3.3, 9.6.8, 9.10.2, 9.10.4, 15.2.8

Mediation

8.3.1, 15.1.3.2, 15.2.1, 15.2.5, 15.2.6, **15.3**, 15.4.1,

15.4.1.1

Minor Changes in the Work

1.1.1, 3.4.2, 3.12.8, 4.2.8, 7.1, **7.4**

Init.

/

MISCELLANEOUS PROVISIONS

13

Modifications, Definition of

1.1.1

Modifications to the Contract

1.1.1, 1.1.2, 2.5, 3.11, 4.1.2, 4.2.1, 5.2.3, 7, 8.3.1, 9.7, 10.3.2

Mutual Responsibility

6.2

Nonconforming Work, Acceptance of

9.6.6, 9.9.3, **12.3**

Nonconforming Work, Rejection and Correction of
2.4, 2.5, 3.5, 4.2.6, 6.2.4, 9.5.1, 9.8.2, 9.9.3, 9.10.4, 12.2

Notice

1.6, 1.6.1, 1.6.2, 2.1.2, 2.2.2., 2.2.3, 2.2.4, 2.5, 3.2.4, 3.3.1, 3.7.4, 3.7.5, 3.9.2, 3.12.9, 3.12.10, 5.2.1, 7.4, 8.2.2, 9.6.8, 9.7, 9.10.1, 10.2.8, 10.3.2, 11.5, 12.2.2.1, 13.4.1, 13.4.2, 14.1, 14.2.2, 14.4.2, 15.1.3, 15.1.5, 15.1.6, 15.4.1

Notice of Cancellation or Expiration of Insurance

11.1.4, 11.2.3

Notice of Claims

1.6.2, 2.1.2, 3.7.4, 9.6.8, 10.2.8, **15.1.3**, 15.1.5, 15.1.6, 15.2.8, 15.3.2, 15.4.1

Notice of Testing and Inspections

13.4.1, 13.4.2

Observations, Contractor's

3.2, 3.7.4

Occupancy

2.3.1, 9.6.6, 9.8

Orders, Written

1.1.1, 2.4, 3.9.2, 7, 8.2.2, 11.5, 12.1, 12.2.2.1, 13.4.2, 14.3.1

OWNER

2

Owner, Definition of

2.1.1

Owner, Evidence of Financial Arrangements

2.2, 13.2.2, 14.1.1.4

Owner, Information and Services Required of the

2.1.2, **2.2**, 2.3, 3.2.2, 3.12.10, 6.1.3, 6.1.4, 6.2.5, 9.3.2, 9.6.1, 9.6.4, 9.9.2, 9.10.3, 10.3.3, 11.2, 13.4.1, 13.4.2, 14.1.1.4, 14.1.4, 15.1.4

Owner's Authority

1.5, 2.1.1, 2.3.32.4, 2.5, 3.4.2, 3.8.1, 3.12.10, 3.14.2, 4.1.2, 4.2.4, 4.2.9, 5.2.1, 5.2.4, 5.4.1, 6.1, 6.3, 7.2.1, 7.3.1, 8.2.2, 8.3.1, 9.3.2, 9.5.1, 9.6.4, 9.9.1, 9.10.2, 10.3.2, 11.4, 11.5, 12.2.2, 12.3, 13.2.2, 14.3, 14.4, 15.2.7

Owner's Insurance

11.2

Owner's Relationship with Subcontractors

1.1.2, 5.2, 5.3, 5.4, 9.6.4, 9.10.2, 14.2.2

Owner's Right to Carry Out the Work

2.5, 14.2.2

Owner's Right to Clean Up

6.3

Owner's Right to Perform Construction and to Award Separate Contracts

6.1

Owner's Right to Stop the Work

2.4

Owner's Right to Suspend the Work

14.3

Owner's Right to Terminate the Contract

14.2, 14.4

Ownership and Use of Drawings, Specifications and Other Instruments of Service

1.1.1, 1.1.6, 1.1.7, **1.5**, 2.3.6, 3.2.2, 3.11, 3.17, 4.2.12, 5.3

Partial Occupancy or Use

9.6.6, **9.9**

Patching, Cutting and

3.14, 6.2.5

Patents

3.17

Payment, Applications for

4.2.5, 7.3.9, 9.2, **9.3**, 9.4, 9.5, 9.6.3, 9.7, 9.8.5, 9.10.1, 14.2.3, 14.2.4, 14.4.3

Payment, Certificates for

4.2.5, 4.2.9, 9.3.3, **9.4**, 9.5, 9.6.1, 9.6.6, 9.7, 9.10.1, 9.10.3, 14.1.1.3, 14.2.4

Payment, Failure of

9.5.1.3, **9.7**, 9.10.2, 13.5, 14.1.1.3, 14.2.1.2

Payment, Final

4.2.1, 4.2.9, **9.10**, 12.3, 14.2.4, 14.4.3

Payment Bond, Performance Bond and

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**

Payments, Progress

9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4

PAYMENTS AND COMPLETION

9

Payments to Subcontractors

5.4.2, 9.5.1.3, 9.6.2, 9.6.3, 9.6.4, 9.6.7, 14.2.1.2

PCB

10.3.1

Performance Bond and Payment Bond

7.3.4.4, 9.6.7, 9.10.3, **11.1.2**

Permits, Fees, Notices and Compliance with Laws

2.3.1, **3.7**, 3.13, 7.3.4.4, 10.2.2

PERSONS AND PROPERTY, PROTECTION OF

10

Polychlorinated Biphenyl

10.3.1

Product Data, Definition of

3.12.2

Product Data and Samples, Shop Drawings

3.11, **3.12**, 4.2.7

Progress and Completion

4.2.2, **8.2**, 9.8, 9.9.1, 14.1.4, 15.1.4

Progress Payments

9.3, **9.6**, 9.8.5, 9.10.3, 14.2.3, 15.1.4

Init.

/

Project, Definition of
1.1.4
Project Representatives
4.2.10
Property Insurance
10.2.5, **11.2**
Proposal Requirements
1.1.1
PROTECTION OF PERSONS AND PROPERTY
10
Regulations and Laws
1.5, 2.3.2, 3.2.3, 3.6, 3.7, 3.12.10, 3.13, 9.6.4, 9.9.1,
10.2.2, 13.1, 13.3, 13.4.1, 13.4.2, 13.5, 14, 15.2.8, 15.4
Rejection of Work
4.2.6, 12.2.1
Releases and Waivers of Liens
9.3.1, 9.10.2
Representations
3.2.1, 3.5, 3.12.6, 8.2.1, 9.3.3, 9.4.2, 9.5.1, 9.10.1
Representatives
2.1.1, 3.1.1, 3.9, 4.1.1, 4.2.10, 13.2.1
Responsibility for Those Performing the Work
3.3.2, 3.18, 4.2.2, 4.2.3, 5.3, 6.1.3, 6.2, 6.3, 9.5.1, 10
Retainage
9.3.1, 9.6.2, 9.8.5, 9.9.1, 9.10.2, 9.10.3
Review of Contract Documents and Field
Conditions by Contractor
3.2, 3.12.7, 6.1.3
Review of Contractor's Submittals by Owner and
Architect
3.10.1, 3.10.2, 3.11, 3.12, 4.2, 5.2, 6.1.3, 9.2, 9.8.2
Review of Shop Drawings, Product Data and Samples
by Contractor
3.12
Rights and Remedies
1.1.2, 2.4, 2.5, 3.5, 3.7.4, 3.15.2, 4.2.6, 5.3, 5.4, 6.1,
6.3, 7.3.1, 8.3, 9.5.1, 9.7, 10.2.5, 10.3, 12.2.1, 12.2.2,
12.2.4, **13.3**, 14, 15.4
Royalties, Patents and Copyrights
3.17
Rules and Notices for Arbitration
15.4.1
Safety of Persons and Property
10.2, 10.4
Safety Precautions and Programs
3.3.1, 4.2.2, 4.2.7, 5.3, **10.1**, 10.2, 10.4
Samples, Definition of
3.12.3
Samples, Shop Drawings, Product Data and
3.11, **3.12**, 4.2.7
Samples at the Site, Documents and
3.11
Schedule of Values
9.2, 9.3.1
Schedules, Construction
3.10, 3.12.1, 3.12.2, 6.1.3, 15.1.6.2

Separate Contracts and Contractors
1.1.4, 3.12.5, 3.14.2, 4.2.4, 4.2.7, 6, 8.3.1, 12.1.2
Separate Contractors, Definition of
6.1.1
Shop Drawings, Definition of
3.12.1
Shop Drawings, Product Data and Samples
3.11, **3.12**, 4.2.7
Site, Use of
3.13, 6.1.1, 6.2.1
Site Inspections
3.2.2, 3.3.3, 3.7.1, 3.7.4, 4.2, 9.9.2, 9.4.2, 9.10.1, 13.4
Site Visits, Architect's
3.7.4, 4.2.2, 4.2.9, 9.4.2, 9.5.1, 9.9.2, 9.10.1, 13.4
Special Inspections and Testing
4.2.6, 12.2.1, 13.4
Specifications, Definition of
1.1.6
Specifications
1.1.1, **1.1.6**, 1.2.2, 1.5, 3.12.10, 3.17, 4.2.14
Statute of Limitations
15.1.2, 15.4.1.1
Stopping the Work
2.2.2, 2.4, 9.7, 10.3, 14.1
Stored Materials
6.2.1, 9.3.2, 10.2.1.2, 10.2.4
Subcontractor, Definition of
5.1.1
SUBCONTRACTORS
5
Subcontractors, Work by
1.2.2, 3.3.2, 3.12.1, 3.18, 4.2.3, 5.2.3, 5.3, 5.4, 9.3.1.2,
9.6.7
Subcontractual Relations
5.3, 5.4, 9.3.1.2, 9.6, 9.10, 10.2.1, 14.1, 14.2.1
Submittals
3.10, 3.11, 3.12, 4.2.7, 5.2.1, 5.2.3, 7.3.4, 9.2, 9.3, 9.8,
9.9.1, 9.10.2, 9.10.3
Submittal Schedule
3.10.2, 3.12.5, 4.2.7
Subrogation, Waivers of
6.1.1, **11.3**
Substances, Hazardous
10.3
Substantial Completion
4.2.9, 8.1.1, 8.1.3, 8.2.3, 9.4.2, **9.8**, 9.9.1, 9.10.3, 12.2,
15.1.2
Substantial Completion, Definition of
9.8.1
Substitution of Subcontractors
5.2.3, 5.2.4
Substitution of Architect
2.3.3
Substitutions of Materials
3.4.2, 3.5, 7.3.8
Sub-subcontractor, Definition of
5.1.2

Init.

/

Subsurface Conditions
3.7.4

Successors and Assigns
13.2

Superintendent
3.9, 10.2.6

Supervision and Construction Procedures
1.2.2, **3.3**, 3.4, 3.12.10, 4.2.2, 4.2.7, 6.1.3, 6.2.4, 7.1.3,
7.3.4, 8.2, 8.3.1, 9.4.2, 10, 12, 14, 15.1.4

Suppliers
1.5, 3.12.1, 4.2.4, 4.2.6, 5.2.1, 9.3, 9.4.2, 9.5.4, 9.6,
9.10.5, 14.2.1

Surety
5.4.1.2, 9.6.8, 9.8.5, 9.10.2, 9.10.3, 11.1.2, 14.2.2,
15.2.7

Surety, Consent of
9.8.5, 9.10.2, 9.10.3

Surveys
1.1.7, 2.3.4

Suspension by the Owner for Convenience
14.3

Suspension of the Work
3.7.5, 5.4.2, 14.3
Suspension or Termination of the Contract
5.4.1.1, 14

Taxes
3.6, 3.8.2.1, 7.3.4.4

Termination by the Contractor
14.1, 15.1.7

Termination by the Owner for Cause
5.4.1.1, **14.2**, 15.1.7

Termination by the Owner for Convenience
14.4

Termination of the Architect
2.3.3
Termination of the Contractor Employment
14.2.2

TERMINATION OR SUSPENSION OF THE CONTRACT
14

Tests and Inspections
3.1.3, 3.3.3, 3.7.1, 4.2.2, 4.2.6, 4.2.9, 9.4.2, 9.8.3,
9.9.2, 9.10.1, 10.3.2, 12.2.1, **13.4**

TIME
8

Time, Delays and Extensions of
3.2.4, 3.7.4, 5.2.3, 7.2.1, 7.3.1, 7.4, **8.3**, 9.5.1, 9.7,
10.3.2, 10.4, 14.3.2, 15.1.6, 15.2.5

Time Limits
2.1.2, 2.2, 2.5, 3.2.2, 3.10, 3.11, 3.12.5, 3.15.1, 4.2,
5.2, 5.3, 5.4, 6.2.4, 7.3, 7.4, 8.2, 9.2, 9.3.1, 9.3.3, 9.4.1,
9.5, 9.6, 9.7, 9.8, 9.9, 9.10, 12.2, 13.4, 14, 15.1.2,
15.1.3, 15.4

Time Limits on Claims
3.7.4, 10.2.8, 15.1.2, 15.1.3

Title to Work
9.3.2, 9.3.3

UNCOVERING AND CORRECTION OF WORK
12

Uncovering of Work
12.1
Unforeseen Conditions, Concealed or Unknown
3.7.4, 8.3.1, 10.3

Unit Prices
7.3.3.2, 9.1.2

Use of Documents
1.1.1, 1.5, 2.3.6, 3.12.6, 5.3

Use of Site
3.13, 6.1.1, 6.2.1

Values, Schedule of
9.2, 9.3.1
Waiver of Claims by the Architect
13.3.2

Waiver of Claims by the Contractor
9.10.5, 13.3.2, **15.1.7**

Waiver of Claims by the Owner
9.9.3, 9.10.3, 9.10.4, 12.2.2.1, 13.3.2, 14.2.4, **15.1.7**
Waiver of Consequential Damages
14.2.4, 15.1.7

Waiver of Liens
9.3, 9.10.2, 9.10.4

Waivers of Subrogation
6.1.1, **11.3**

Warranty
3.5, 4.2.9, 9.3.3, 9.8.4, 9.9.1, 9.10.2, 9.10.4, 12.2.2,
15.1.2

Weather Delays
8.3, 15.1.6.2

Work, Definition of
1.1.3

Written Consent
1.5.2, 3.4.2, 3.7.4, 3.12.8, 3.14.2, 4.1.2, 9.3.2, 9.10.3,
13.2, 13.3.2, 15.4.4.2

Written Interpretations
4.2.11, 4.2.12

Written Orders
1.1.1, 2.4, 3.9, 7, 8.2.2, 12.1, 12.2, 13.4.2, 14.3.1

ARTICLE 1 GENERAL PROVISIONS

§ 1.1 Basic Definitions

§ 1.1.1 The Contract Documents

The Contract Documents are enumerated in the Agreement between the Owner and Contractor (hereinafter the Agreement) and consist of the Agreement, Conditions of the Contract (General, Supplementary and other Conditions), Drawings, Specifications, Addenda issued prior to execution of the Contract, other documents listed in the Agreement, and Modifications issued after execution of the Contract. A Modification is (1) a written amendment to the Contract signed by both parties, (2) a Change Order, (3) a Construction Change Directive, or (4) a written order for a minor change in the Work issued by the Architect. Unless specifically enumerated in the Agreement, the Contract Documents do not include the advertisement or invitation to bid, Instructions to Bidders, sample forms, other information furnished by the Owner in anticipation of receiving bids or proposals, the Contractor's bid or proposal, or portions of Addenda relating to bidding or proposal requirements.

§ 1.1.2 The Contract

The Contract Documents form the Contract for Construction. The Contract represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations, or agreements, either written or oral. The Contract may be amended or modified only by a Modification. The Contract Documents shall not be construed to create a contractual relationship of any kind (1) between the Contractor and the Architect or the Architect's consultants, (2) between the Owner and a Subcontractor or a Sub-subcontractor, (3) between the Owner and the Architect or the Architect's consultants, or (4) between any persons or entities other than the Owner and the Contractor. The Architect shall, however, be entitled to performance and enforcement of obligations under the Contract intended to facilitate performance of the Architect's duties.

§ 1.1.3 The Work

The term "Work" means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all other labor, materials, equipment, and services provided or to be provided by the Contractor to fulfill the Contractor's obligations. The Work may constitute the whole or a part of the Project.

§ 1.1.4 The Project

The Project is the total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by the Owner and by Separate Contractors.

§ 1.1.5 The Drawings

The Drawings are the graphic and pictorial portions of the Contract Documents showing the design, location and dimensions of the Work, generally including plans, elevations, sections, details, schedules, and diagrams.

§ 1.1.6 The Specifications

The Specifications are that portion of the Contract Documents consisting of the written requirements for materials, equipment, systems, standards and workmanship for the Work, and performance of related services.

§ 1.1.7 Instruments of Service

Instruments of Service are representations, in any medium of expression now known or later developed, of the tangible and intangible creative work performed by the Architect and the Architect's consultants under their respective professional services agreements. Instruments of Service may include, without limitation, studies, surveys, models, sketches, drawings, specifications, and other similar materials.

§ 1.1.8 Initial Decision Maker

The Initial Decision Maker is the person identified in the Agreement to render initial decisions on Claims in accordance with Section 15.2. The Initial Decision Maker shall not show partiality to the Owner or Contractor and shall not be liable for results of interpretations or decisions rendered in good faith.

§ 1.2 Correlation and Intent of the Contract Documents

§ 1.2.1 The intent of the Contract Documents is to include all items necessary for the proper execution and completion of the Work by the Contractor. The Contract Documents are complementary, and what is required by one shall be as binding as if required by all; performance by the Contractor shall be required only to the extent consistent with the Contract Documents and reasonably inferable from them as being necessary to produce the indicated results.

§ 1.2.1.1 The invalidity of any provision of the Contract Documents shall not invalidate the Contract or its remaining provisions. If it is determined that any provision of the Contract Documents violates any law, or is otherwise invalid or unenforceable, then that provision shall be revised to the extent necessary to make that provision legal and enforceable. In such case the Contract Documents shall be construed, to the fullest extent permitted by law, to give effect to the parties' intentions and purposes in executing the Contract.

§ 1.2.1.2 **Should conflict occur between the Contract Documents, the Contractor is deemed to have based the bid upon the more expensive method of performing the Work and may be required to perform the Work correspondingly.**

§ 1.2.1.3 **The Drawings show generally the location and arrangement of construction fixtures and are intended to depict the general intent of the Work in secure layout and liability of workmanship. They are not intended to show in detail all accessories and related Work necessary for the execution of the Work, but is understood that such details are part of this Work.**

§ 1.2.2 Organization of the Specifications into divisions, sections and articles, and arrangement of Drawings shall not control the Contractor in dividing the Work among Subcontractors or in establishing the extent of Work to be performed by any trade.

§ 1.2.3 Unless otherwise stated in the Contract Documents, words that have well-known technical or construction industry meanings are used in the Contract Documents in accordance with such recognized meanings.

§ 1.3 Capitalization

Terms capitalized in these General Conditions include those that are (1) specifically defined, (2) the titles of numbered articles, or (3) the titles of other documents published by the American Institute of Architects.

§ 1.4 Interpretation

In the interest of brevity the Contract Documents frequently omit modifying words such as "all" and "any" and articles such as "the" and "an," but the fact that a modifier or an article is absent from one statement and appears in another is not intended to affect the interpretation of either statement.

§ 1.4.2 **The captions used in the Contract Documents are for convenience and reference only and in no way define, describe, extend, or limit the scope, meaning, or intent of the Contract Documents.**

§ 1.5 Ownership and Use of Drawings, Specifications, and Other Instruments of Service

§ 1.5.1 The Architect and the Architect's consultants shall be deemed the authors and owners of their respective Instruments of Service, including the Drawings and Specifications, and retain all common law, statutory, and other reserved rights in their Instruments of Service, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and suppliers shall not own or claim a copyright in the Instruments of Service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with the Project is not to be construed as publication in derogation of the Architect's or Architect's consultants' reserved rights.

§ 1.5.2 The Contractor, Subcontractors, Sub-subcontractors, and suppliers are authorized to use and reproduce the Instruments of Service provided to them, subject to any protocols established pursuant to Sections 1.7 and 1.8, solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Instruments of Service. The Contractor, Subcontractors, Sub-subcontractors, and suppliers may not use the Instruments of Service on other projects or for additions to the Project outside the scope of the Work without the specific written consent of the Owner, Architect, and the Architect's consultants.

§ 1.6 Notice

§ 1.6.1 Except as otherwise provided in Section 1.6.2, where the Contract Documents require one party to notify or give notice to the other party, such notice shall be provided in writing to the designated representative of the party to whom the notice is addressed and shall be deemed to have been duly served if delivered in person, by mail, by courier, or by electronic transmission if a method for electronic transmission is set forth in the Agreement.

§ 1.6.2 Notice of Claims as provided in Section 15.1.3 shall be provided in writing and shall be deemed to have been duly served only if delivered to the designated representative of the party to whom the notice is addressed by certified or registered mail, or by courier providing proof of delivery.

§ 1.7 Digital Data Use and Transmission

The parties shall agree upon protocols governing the transmission and use of Instruments of Service or any other information or documentation in digital form. The parties will use AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, to establish the protocols for the development, use, transmission, and exchange of digital data.

§ 1.7.1 The Contract Documents executed or identified in accordance with Subparagraph 1.1.1 shall prevail in case of any inconsistency with subsequent versions made through manipulatable electronics and/or digital operations.

§ 1.7.2 The Architect may, with the concurrence of the Owner, furnish to the Contractor digital versions of the Instruments of Services.

§ 1.7.3 The use, transmission and rights to digital documents shall be as stated in AIA E201 – 2007, which shall be incorporated by reference in its original form or revised and amended to all agreements.

§ 1.7.4 All Contracts and Subcontracts for the Work shall be bound by the requirements stated in Section 1.7.

§ 1.8 Building Information Models Use and Reliance

Any use of, or reliance on, all or a portion of a building information model without agreement to protocols governing the use of, and reliance on, the information contained in the model and without having those protocols set forth in AIA Document E203™–2013, Building Information Modeling and Digital Data Exhibit, and the requisite AIA Document G202™–2013, Project Building Information Modeling Protocol Form, shall be at the using or relying party's sole risk and without liability to the other party and its contractors or consultants, the authors of, or contributors to, the building information model, and each of their agents and employees.

ARTICLE 2 OWNER

§ 2.1 General

§ 2.1.1 The Owner is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Owner shall designate in writing a representative who shall have express authority to bind the Owner with respect to all matters requiring the Owner's approval or authorization. Except as otherwise provided in Section 4.2.1, the Architect does not have such authority. The term "Owner" means the Owner or the Owner's authorized representative.

§ 2.1.2 The Owner shall furnish to the Contractor, within fifteen days after receipt of a written request, information necessary and relevant for the Contractor to evaluate, give notice of, or enforce mechanic's lien rights. Such information shall include a correct statement of the record legal title to the property on which the Project is located, usually referred to as the site, and the Owner's interest therein.

§ 2.2 Evidence of the Owner's Financial Arrangements

§ 2.2.1 Prior to commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract. The Contractor shall have no obligation to commence the Work until the Owner provides such evidence. If commencement of the Work is delayed under this Section 2.2.1, the Contract Time shall be extended appropriately.

§ 2.2.2 Following commencement of the Work and upon written request by the Contractor, the Owner shall furnish to the Contractor reasonable evidence that the Owner has made financial arrangements to fulfill the Owner's obligations under the Contract only if (1) the Owner fails to make payments to the Contractor as the Contract Documents require; (2) the Contractor identifies in writing a reasonable concern regarding the Owner's ability to make payment when due; or (3) a change in the Work materially changes the Contract Sum. If the Owner fails to provide such evidence, as required, within fourteen days of the Contractor's request, the Contractor may immediately stop the Work and, in that event, shall notify the Owner that the Work has stopped. However, if the request is made because a change in the Work

Init.

materially changes the Contract Sum under (3) above, the Contractor may immediately stop only that portion of the Work affected by the change until reasonable evidence is provided. If the Work is stopped under this Section 2.2.2, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided in the Contract Documents.

§ 2.2.3 After the Owner furnishes evidence of financial arrangements under this Section 2.2, the Owner shall not materially vary such financial arrangements without prior notice to the Contractor.

§ 2.2.4 Where the Owner has designated information furnished under this Section 2.2 as "confidential," the Contractor shall keep the information confidential and shall not disclose it to any other person. However, the Contractor may disclose "confidential" information, after seven (7) days' notice to the Owner, where disclosure is required by law, including a subpoena or other form of compulsory legal process issued by a court or governmental entity, or by court or arbitrator(s) order. The Contractor may also disclose "confidential" information to its employees, consultants, sureties, Subcontractors and their employees, Sub-subcontractors, and others who need to know the content of such information solely and exclusively for the Project and who agree to maintain the confidentiality of such information.

§ 2.3 Information and Services Required of the Owner

§ 2.3.1 Except for permits and fees that are the responsibility of the Contractor under the Contract Documents, including those required under Section 3.7.1, the Owner shall secure and pay for necessary approvals, easements, assessments and charges required for construction, use or occupancy of permanent structures or for permanent changes in existing facilities.

§ 2.3.2 The Owner shall retain an architect lawfully licensed to practice architecture, or an entity lawfully practicing architecture, in the jurisdiction where the Project is located. That person or entity is identified as the Architect in the Agreement and is referred to throughout the Contract Documents as if singular in number.

§ 2.3.3 If the employment of the Architect terminates, the Owner shall employ a successor to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect.

§ 2.3.4 The Owner shall furnish surveys describing physical characteristics, legal limitations and utility locations for the site of the Project, and a legal description of the site. The Contractor shall be entitled to rely on the accuracy of information furnished by the Owner but shall exercise proper precautions relating to the safe performance of the Work.

§ 2.3.5 The Owner shall furnish information or services required of the Owner by the Contract Documents with reasonable promptness. The Owner shall also furnish any other information or services under the Owner's control and relevant to the Contractor's performance of the Work with reasonable promptness after receiving the Contractor's written request for such information or services.

§ 2.3.6 Unless otherwise provided in the Contract Documents, the Owner shall furnish to the Contractor one copy of the Contract Documents for purposes of making reproductions pursuant to Section 1.5.2.

§ 2.4 Owner's Right to Stop the Work

If the Contractor fails to correct Work that is not in accordance with the requirements of the Contract Documents as required by Section 12.2 or repeatedly fails to carry out Work in accordance with the Contract Documents, the Owner may issue a written order to the Contractor to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, the right of the Owner to stop the Work shall not give rise to a duty on the part of the Owner to exercise this right for the benefit of the Contractor or any other person or entity, except to the extent required by Section 6.1.3.

§ 2.5 Owner's Right to Carry Out the Work

If the Contractor defaults or neglects to carry out the Work in accordance with the Contract Documents and fails within a ten-day period after receipt of notice from the Owner to commence and continue correction of such default or neglect with diligence and promptness, the Owner may, without prejudice to other remedies the Owner may have, correct such default or neglect. Such action by the Owner and amounts charged to the Contractor are both subject to prior approval of the Architect and the Architect may, pursuant to Section 9.5.1, withhold or nullify a Certificate of Payment in whole or in part, to the extent reasonably necessary to reimburse the Owner for the reasonable cost of

correcting such deficiencies, including Owner's expenses and compensation for the Architect's additional services made necessary by such default, neglect, or failure. If current and future payments are not sufficient to cover such amounts, the Contractor shall pay the difference to the Owner. If the Contractor disagrees with the actions of the Owner or the Architect, or the amounts claimed as costs to the Owner, the Contractor may file a Claim pursuant to Article 15.

§ 2.6 NOTICE OF COMMENCEMENT

The Owner shall endeavor to record a Notice of Commencement with the county Recorder prior to the start of construction. This Notice of Commencement shall pertain to Work provided for this project only. The Owner shall post a copy of the Notice of Commencement in a conspicuous place on the construction site or provide a copy to the Contractor within ten (10) days after being requested to do so in writing by the Contractor.

ARTICLE 3 CONTRACTOR

§ 3.1 General

§ 3.1.1 The Contractor is the person or entity identified as such in the Agreement and is referred to throughout the Contract Documents as if singular in number. The Contractor shall be lawfully licensed, if required in the jurisdiction where the Project is located. The Contractor shall designate in writing a representative who shall have express authority to bind the Contractor with respect to all matters under this Contract. The term "Contractor" means the Contractor or the Contractor's authorized representative.

§ 3.1.2 The Contractor shall perform the Work in accordance with the Contract Documents.

§ 3.1.3 The Contractor shall not be relieved of its obligations to perform the Work in accordance with the Contract Documents either by activities or duties of the Architect in the Architect's administration of the Contract, or by tests, inspections or approvals required or performed by persons or entities other than the Contractor.

§ 3.2 Review of Contract Documents and Field Conditions by Contractor

§ 3.2.1 Execution of the Contract by the Contractor is a representation that the Contractor has visited the site, become generally familiar with local conditions under which the Work is to be performed, and correlated personal observations with requirements of the Contract Documents **and determined that the Work can be performed as required and completed within the timeframe allowed .**

§ 3.2.2 Because the Contract Documents are complementary, the Contractor shall, before starting each portion of the Work, carefully study and compare the various Contract Documents relative to that portion of the Work, as well as the information furnished by the Owner pursuant to Section 2.3.4, shall take field measurements of any existing conditions related to that portion of the Work, and shall observe any conditions at the site affecting it. These obligations are for the purpose of facilitating coordination and construction by the Contractor and are not for the purpose of discovering errors, omissions, or inconsistencies in the Contract Documents; however, the Contractor shall promptly report to the Architect any errors, inconsistencies or omissions discovered by or made known to the Contractor as a request for information in such form as the Architect may require. It is recognized that the Contractor's review is made in the Contractor's capacity as a contractor and not as a licensed design professional, unless otherwise specifically provided in the Contract Documents.

§ 3.2.3 The Contractor is not required to ascertain that the Contract Documents are in accordance with applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, but the Contractor shall promptly report to the Architect any nonconformity discovered by or made known to the Contractor as a request for information in such form as the Architect may require.

§ 3.2.4 If the Contractor believes that additional cost or time is involved because of clarifications or instructions the Architect issues in response to the Contractor's notices or requests for information pursuant to Sections 3.2.2 or 3.2.3, the Contractor shall submit Claims as provided in Article 15. If the Contractor fails to perform the obligations of Sections 3.2.2 or 3.2.3, the Contractor shall pay such costs and damages to the Owner, subject to Section 15.1.7, as would have been avoided if the Contractor had performed such obligations. If the Contractor performs those obligations, the Contractor shall not be liable to the Owner or Architect for damages resulting from errors, inconsistencies or omissions in the Contract Documents, for differences between field measurements or conditions and the Contract Documents, or for nonconformities of the Contract Documents to applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities.

§ 3.2.5 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for additional services for the Architect to evaluate and respond to Contractor's request for information or product substitutions where such information is readily ascertainable in the Contract Documents, Correspondence or Project's Documentation.

§ 3.2.6 The Owner is entitled to reimbursement from the Contractor for amounts paid to the Architect for evaluating and responding to the Contractor's requests for information that are not prepared in accordance with the Contract Documents or where the requested information is available to the contractor from a careful study and comparison of the contract Documents, field conditions, other Owner-provided information, Contractor-prepared coordination drawings, or prior Project correspondence or documentation.

§ 3.3 Supervision and Construction Procedures

§ 3.3.1 The Contractor shall supervise and direct the Work, using the Contractor's best skill and attention. The Contractor shall be solely responsible for, and have control over, construction means, methods, techniques, sequences, and procedures, and for coordinating all portions of the Work under the Contract. If the Contract Documents give specific instructions concerning construction means, methods, techniques, sequences, or procedures, the Contractor shall evaluate the jobsite safety thereof and shall be solely responsible for the jobsite safety of such means, methods, techniques, sequences, or procedures. If the Contractor determines that such means, methods, techniques, sequences or procedures may not be safe, the Contractor shall give timely notice to the Owner and Architect, and shall propose alternative means, methods, techniques, sequences, or procedures. The Architect shall evaluate the proposed alternative solely for conformance with the design intent for the completed construction. Unless the Architect objects to the Contractor's proposed alternative, the Contractor shall perform the Work using its alternative means, methods, techniques, sequences, or procedures.

§ 3.3.2 The Contractor shall be responsible to the Owner for acts and omissions of the Contractor's employees, Subcontractors and their agents and employees, and other persons or entities performing portions of the Work for, or on behalf of, the Contractor or any of its Subcontractors.

§ 3.3.3 The Contractor shall be responsible for inspection of portions of Work already performed to determine that such portions are in proper condition to receive subsequent Work.

§ 3.3.4 If any of the Work must be inspected or approved by any public authority, the Contractor shall cause such inspection or approval to be performed. The Owner or the Architect's inspection or approval or failure to inspect or approve any portion of the Work shall not act as a waiver of the Contractor's obligations.

§ 3.3.5 Notwithstanding any other provision of the Contract Documents or the Owner's responsibilities defined in 2.3.4 to the contrary, the Contractor shall be responsible for locating (and shall locate prior to performing any Work) all above – and below – ground utilities on or about the site, and shall perform all work in such a manner so as to avoid damaging any such utilities. "Such utilities" includes, but is not limited to, service and transmission facilities for electricity, communication, water, sewer and gas.

§ 3.4 Labor and Materials

§ 3.4.1 Unless otherwise provided in the Contract Documents, the Contractor shall provide and pay for labor, materials, equipment, tools, construction equipment and machinery, water, heat, utilities, transportation, and other facilities and services necessary for proper execution and completion of the Work, whether temporary or permanent and whether or not incorporated or to be incorporated in the Work.

§ 3.4.2 Except in the case of minor changes in the Work approved by the Architect in accordance with Section 3.12.8 or ordered by the Architect in accordance with Section 7.4, the Contractor may make substitutions only with the consent of the Owner, after evaluation by the Architect and in accordance with a Change Order or Construction Change Directive.

§ 3.4.2.1 After the Contract has been executed, the Owner and Architect may consider timely requests for the substitution of products in place of those specified only under the conditions set forth in the General Requirements (Division 1 of the Specifications). The Architect will not consider substitutions as a remedy for

the Contractor's failure to submit, order or procure any product as specified in the Contract Documents with sufficient time to be incorporated into the work. By making requests for substitutions, the Contractor:

- .1 represents that it has personally investigated the proposed substitute product and determined that it is equal or superior in all respects to that specified.**
- .2 represents that it will provide the same warranty for the substitution as it would have provided for the product specified.**
- .3 certifies that the cost data presented is complete and includes all related costs for the substituted product and for Work that must be changed as a result of the substitution, except for the Architect's redesign costs, and waives all claims for additional costs related to the substitution that subsequently become apparent; and**
- .4 shall coordinate the installation of the accepted substitute, making such changes as may be required for the Work to be complete in all respects.**

§ 3.4.3 The Contractor shall enforce strict discipline and good order among the Contractor's employees and other persons carrying out the Work. The Contractor shall not permit employment of unfit persons or persons not properly skilled in tasks assigned to them.

§ 3.4.4 If the Owner or the Architect deems any employee of the Contractor or a Subcontractor unsatisfactory, the Contractor shall transfer or require its Subcontractor to transfer such employee from the Project immediately.

§ 3.5 Warranty

§ 3.5.1 The Contractor warrants to the Owner and Architect that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements may be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

§ 3.5.2 All material, equipment, or other special warranties required by the Contract Documents shall be issued in the name of the Owner, or shall be transferable to the Owner, and shall commence in accordance with Section 9.8.4.

§ 3.6 Taxes

The Contractor shall pay sales, consumer, use and similar taxes for the Work provided by the Contractor that are legally enacted when bids are received or negotiations concluded, whether or not yet effective or merely scheduled to go into effect.

§ 3.6.1 When the Owner is a tax-exempt entity, materials purchased for incorporation into the Work are exempt from State and Use tax requirements. The Contractor shall comply with all laws pertaining to such tax exemption and shall be required to have exemption certificates signed by a representative of the Owner.

§ 3.7 Permits, Fees, Notices and Compliance with Laws

§ 3.7.1 Unless otherwise provided in the Contract Documents, the Contractor shall secure and pay for the building permit as well as for other permits, fees, licenses, and inspections by government agencies necessary for proper execution and completion of the Work that are customarily secured after execution of the Contract and legally required at the time bids are received or negotiations concluded.

§ 3.7.2 The Contractor shall comply with and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities applicable to performance of the Work.

§ 3.7.3 If the Contractor performs Work knowing it to be contrary to applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of public authorities, the Contractor shall assume appropriate responsibility for such Work and shall bear the costs attributable to correction.

§ 3.7.4 Concealed or Unknown Conditions

If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature that 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, the Contractor shall promptly provide notice to the Owner and the Architect before conditions are disturbed and in no event later than 14 days after first observance of the conditions. The Architect will promptly investigate such conditions and, if the Architect determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend that an equitable adjustment be made in the Contract Sum or Contract Time, or both. If the Architect determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect shall promptly notify the Owner and Contractor, stating the reasons. If either party disputes the Architect's determination or recommendation, that party may submit a Claim as provided in Article 15.

§ 3.7.5 If, in the course of the Work, the Contractor encounters human remains or recognizes the existence of burial markers, archaeological sites or wetlands not indicated in the Contract Documents, the Contractor shall immediately suspend any operations that would affect them and shall notify the Owner and Architect. Upon receipt of such notice, the Owner shall promptly take any action necessary to obtain governmental authorization required to resume the operations. The Contractor shall continue to suspend such operations until otherwise instructed by the Owner but shall continue with all other operations that do not affect those remains or features. Requests for adjustments in the Contract Sum and Contract Time arising from the existence of such remains or features may be made as provided in Article 15.

§ 3.8 Allowances

§ 3.8.1 The Contractor shall include in the Contract Sum all allowances stated in the Contract Documents. Items covered by allowances shall be supplied for such amounts and by such persons or entities as the Owner may direct, but the Contractor shall not be required to employ persons or entities to whom the Contractor has reasonable objection.

§ 3.8.2 Unless otherwise provided in the Contract Documents,

- .1 allowances shall cover the cost to the Contractor of materials and equipment delivered at the site and all required taxes, less applicable trade discounts;
- .2 Contractor's costs for unloading and handling at the site, labor, installation costs, overhead, profit, and other expenses contemplated for stated allowance amounts shall be included in the Contract Sum but not in the allowances; and
- .3 whenever costs are more than or less than allowances, the Contract Sum shall be adjusted accordingly by Change Order. The amount of the Change Order shall reflect (1) the difference between actual costs and the allowances under Section 3.8.2.1 and (2) changes in Contractor's costs under Section 3.8.2.2.

§ 3.8.3 Materials and equipment under an allowance shall be selected by the Owner with reasonable promptness.

§ 3.9 Superintendent

§ 3.9.1 The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project site **on a full time basis or on a regular, daily schedule acceptable to the Owner and Architect** during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

§ 3.9.2 The Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the name and qualifications of a proposed superintendent. Within 14 days of receipt of the information, the Architect may notify the Contractor, stating whether the Owner or the Architect (1) has reasonable objection to the proposed superintendent or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 3.9.3 The Contractor shall not employ a proposed superintendent to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not unreasonably be withheld or delayed.

§ 3.10 Contractor's Construction and Submittal Schedules

§ 3.10.1 The Contractor, promptly after being awarded the Contract, shall submit for the Owner's and Architect's information a Contractor's construction schedule for the Work. The schedule shall contain detail appropriate for the Project, including (1) the date of commencement of the Work, interim schedule milestone dates, and the date of Substantial Completion; (2) an apportionment of the Work by construction activity; and (3) the time required for completion of each portion of the Work. The schedule shall provide for the orderly progression of the Work to completion and shall not exceed time limits current under the Contract Documents. The schedule shall be revised at appropriate intervals as required by the conditions of the Work and Project.

§ 3.10.2 The Contractor, promptly after being awarded the Contract and thereafter as necessary to maintain a current submittal schedule, shall submit a submittal schedule for the Architect's approval. The Architect's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, or fails to provide submittals in accordance with the approved submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

§ 3.10.3 The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect.

§ 3.10.4 In no event shall the Owner's or Architect's review or approval of any schedule (a) impose on the Owner or Architect any responsibility for the progress, scheduling, sequencing, or timing of the Work, or (b) relieve the Contractor from full responsibility therefore as the Contractor is solely responsible for the preparation, accuracy, revision, and maintenance of its schedules.

§ 3.10.5 The Contractor shall furnish such employees, materials, facilities, and equipment and shall work such hours, including extra shifts, overtime operations, and Sundays, and holidays as may be necessary to ensure the prosecution and completion of the Work in accordance with the Contractor's Construction Schedule. If the Contractor does not perform the Work in accordance with the Contractor's Construction Schedule and it becomes apparent that the Work may not be completed within the contract Time, the Contractor shall, at no additional cost to the Owner, as necessary to improve its progress; (a) increase the number of employees in such crafts as will regain lost schedule progress; and (b) increase the number of working hours per shift, shifts per working day, working days per week, the amount of equipment or any combination of the foregoing measures to regain lost schedule progress.

§ 3.10.6 The Owner or Architect may require the Contractor to prepare and submit a recovery schedule demonstrating the Contractor's program and proposed plan to regain lost schedule progress and to ensure completion of the Work within the Contract Time. If the Owner or the Architect finds the proposed plan unacceptable, the Contractor shall be required to submit a new plan. If the actions taken by the Contractor or the second proposed plan are not satisfactory, the Owner or Architect may require the Contractor to take any of the actions set forth in Subparagraph 3.10.5.

§ 3.11 Documents and Samples at the Site

The Contractor shall make available, at the Project site, the Contract Documents, including Change Orders, Construction Change Directives, and other Modifications, in good order and marked currently to indicate field changes and selections made during construction, and the approved Shop Drawings, Product Data, Samples, and similar required submittals. These shall be in electronic form or paper copy, available to the Architect and Owner, and delivered to the Architect for submittal to the Owner upon completion of the Work as a record of the Work as constructed.

§ 3.12 Shop Drawings, Product Data and Samples

§ 3.12.1 Shop Drawings are drawings, diagrams, schedules, and other data specially prepared for the Work by the Contractor or a Subcontractor, Sub-subcontractor, manufacturer, supplier, or distributor to illustrate some portion of the Work.

§ 3.12.2 Product Data are illustrations, standard schedules, performance charts, instructions, brochures, diagrams, and other information furnished by the Contractor to illustrate materials or equipment for some portion of the Work.

Init.

§ 3.12.3 Samples are physical examples that illustrate materials, equipment, or workmanship, and establish standards by which the Work will be judged.

§ 3.12.4 Shop Drawings, Product Data, Samples, and similar submittals are not Contract Documents. Their purpose is to demonstrate how the Contractor proposes to conform to the information given and the design concept expressed in the Contract Documents for those portions of the Work for which the Contract Documents require submittals. Review by the Architect is subject to the limitations of Section 4.2.7. Informational submittals upon which the Architect is not expected to take responsive action may be so identified in the Contract Documents. Submittals that are not required by the Contract Documents may be returned by the Architect without action.

§ 3.12.5 The Contractor shall review for compliance with the Contract Documents, approve, and submit to the Architect, Shop Drawings, Product Data, Samples, and similar submittals required by the Contract Documents, in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness and in such sequence as to cause no delay in the Work or in the activities of the Owner or of Separate Contractors.

§ 3.12.6 By submitting Shop Drawings, Product Data, Samples, and similar submittals, the Contractor represents to the Owner and Architect that the Contractor has (1) reviewed and approved them, (2) determined and verified materials, field measurements and field construction criteria related thereto, or will do so, and (3) checked and coordinated the information contained within such submittals with the requirements of the Work and of the Contract Documents.

§ 3.12.7 The Contractor shall perform no portion of the Work for which the Contract Documents require submittal and review of Shop Drawings, Product Data, Samples, or similar submittals, until the respective submittal has been approved by the Architect.

§ 3.12.8 The Work shall be in accordance with approved submittals except that the Contractor shall not be relieved of responsibility for deviations from the requirements of the Contract Documents by the Architect's approval of Shop Drawings, Product Data, Samples, or similar submittals, unless the Contractor has specifically notified the Architect of such deviation at the time of submittal and (1) the Architect has given written approval to the specific deviation as a minor change in the Work, or (2) a Change Order or Construction Change Directive has been issued authorizing the deviation. The Contractor shall not be relieved of responsibility for errors or omissions in Shop Drawings, Product Data, Samples, or similar submittals, by the Architect's approval thereof.

§ 3.12.9 The Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, Product Data, Samples, or similar submittals, to revisions other than those requested by the Architect on previous submittals. In the absence of such notice, the Architect's approval of a resubmission shall not apply to such revisions.

§ 3.12.10 The Contractor shall not be required to provide professional services that constitute the practice of architecture or engineering unless such services are specifically required by the Contract Documents for a portion of the Work or unless the Contractor needs to provide such services in order to carry out the Contractor's responsibilities for construction means, methods, techniques, sequences, and procedures. The Contractor shall not be required to provide professional services in violation of applicable law.

§ 3.12.10.1 If professional design services or certifications by a design professional related to systems, materials, or equipment are specifically required of the Contractor by the Contract Documents, the Owner and the Architect will specify **appropriate** performance and design criteria that such services must satisfy. The Contractor shall be entitled to rely upon the adequacy and accuracy of the performance and design criteria provided in the Contract Documents. The Contractor shall cause such services or certifications to be provided by an appropriately licensed design professional, whose signature and seal shall appear on all drawings, calculations, specifications, certifications, Shop Drawings, and other submittals prepared by such professional. Shop Drawings, and other submittals related to the Work, designed or certified by such professional, if prepared by others, shall bear such professional's written approval when submitted to the Architect. The Owner and the Architect shall be entitled to rely upon the adequacy and accuracy of the services, certifications, and approvals performed or provided by such design professionals, provided the Owner and Architect have specified to the Contractor the **appropriate** performance and design criteria that such services must satisfy. Pursuant to this Section 3.12.10, the Architect will review and approve or take other appropriate action

on submittals only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents.

§ 3.12.10.2 If the Contract Documents require the Contractor's design professional to certify that the Work has been performed in accordance with the design criteria, the Contractor shall furnish such certifications to the Architect at the time and in the form specified by the Architect.

INCLUDE ONLY WITH OWNER'S CONSENT

§ 3.12.11 The Architect's review of Contractor's submittals will be limited to examination of an initial submittal and one (1) resubmittal. The Architect's review of additional submittals will be made only with the consent of the Owner after notification by the Architect. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for evaluation of such additional resubmittals.

§ 3.13 Use of Site

The Contractor shall confine operations at the site to areas permitted by applicable laws, statutes, ordinances, codes, rules and regulations, lawful orders of public authorities, and the Contract Documents and shall not unreasonably encumber the site with materials or equipment.

§ 3.13.1 The Contractor shall store and stage building materials and equipment (a) only as authorized or approved by the Owner; (b) so as not to create a hazard; and (c) properly protected at all times from the elements. The Contractor shall not use the site to store any materials or equipment, not immediately needed for the Work.

§ 3.13.2 The Contractor shall ensure free, unencumbered, and safe direct access to and from the properties neighboring the site for the owner's of such properties and their respective lessees, agents, invitees, and guests at all times during the performance of the Work. The Contractor shall be solely responsible for any damage to any such land or area to the Owner or occupant thereof or any land or areas contiguous thereto resulting from the performance of the Work.

§ 3.14 Cutting and Patching

§ 3.14.1 The Contractor shall be responsible for cutting, fitting, or patching required to complete the Work or to make its parts fit together properly. All areas requiring cutting, fitting, or patching shall be restored to the condition existing prior to the cutting, fitting, or patching, unless otherwise required by the Contract Documents.

§ 3.14.2 The Contractor shall not damage or endanger a portion of the Work or fully or partially completed construction of the Owner or Separate Contractors by cutting, patching, or otherwise altering such construction, or by excavation. The Contractor shall not cut or otherwise alter construction by the Owner or a Separate Contractor except with written consent of the Owner and of the Separate Contractor. Consent shall not be unreasonably withheld. The Contractor shall not unreasonably withhold, from the Owner or a Separate Contractor, its consent to cutting or otherwise altering the Work.

§ 3.14.3 The Contractor is responsible for protecting its own work and shall not perform its work in a sequence which will unreasonably impede the work of other contractors or which will be damaged or removed in order for another contractor to complete its work.

§ 3.15 Cleaning Up

§ 3.15.1 The Contractor shall keep the premises and surrounding area free from accumulation of waste materials and rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery, and surplus materials from and about the Project.

§ 3.15.2 If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and the Owner shall be entitled to reimbursement from the Contractor.

§ 3.16 Access to Work

The Contractor shall provide the Owner and Architect with access to the Work in preparation and progress wherever located.

§ 3.16.1 The Contractor shall provide the Owner, Architect, testing agencies, and governmental authorities with a jurisdictional interest in the Work with access to the Work in preparation and progress wherever located. The Contractor shall provide proper facilities for such access.

§ 3.17 Royalties, Patents and Copyrights

The Contractor shall pay all royalties and license fees. The Contractor shall defend suits or claims for infringement of copyrights and patent rights and shall hold the Owner and Architect harmless from loss on account thereof, but shall not be responsible for defense or loss when a particular design, process, or product of a particular manufacturer or manufacturers is required by the Contract Documents, or where the copyright violations are contained in Drawings, Specifications, or other documents prepared by the Owner or Architect. However, if an infringement of a copyright or patent is discovered by, or made known to, the Contractor, the Contractor shall be responsible for the loss unless the information is promptly furnished to the Architect.

§ 3.18 Indemnification

§ 3.18.1 To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect, Architect's consultants, and agents and employees of any of them from and against claims, damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work, provided that 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), but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor, anyone directly or indirectly employed by them, or anyone for whose acts they may be liable, regardless of whether or not such claim, damage, loss, or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity that would otherwise exist as to a party or person described in this Section 3.18.

§ 3.18.2 In claims against any person or entity indemnified under this Section 3.18 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 Section 3.18.1 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' compensation acts, disability benefit acts, or other employee benefit acts.

§ 3.18.3 Contractor shall also indemnify and hold Owner and Architect and their consultants, agents and employees harmless from any claims, damages, injuries, or liability that directly or indirectly results from or arises out of the breach of this Agreement and/or the violation of any applicable law by Contractor, a Subcontractor, a Sub-subcontractor or anyone for whom any of the above are deemed to be responsible or liable. This provision is not intended in any way to limit the rights of the Owner or the Architect under the Section 3.18, but is intended to clarify that such indemnification rights will likewise arise out of a breach of contract or isolation of applicable law.

§ 3.18.4 The Contractor shall cause the provisions of this paragraph 3.18 to be included, in every subcontract, regardless of tier, entered into the furtherance of the Work.

ARTICLE 4 ARCHITECT

§ 4.1 General

§ 4.1.1 The Architect is the person or entity retained by the Owner pursuant to Section 2.3.2 and identified as such in the Agreement.

§ 4.1.2 Duties, responsibilities, and limitations of authority of the Architect as set forth in the Contract Documents shall not be restricted, modified, or extended without written consent of the Owner, Contractor, and Architect. Consent shall not be unreasonably withheld.

§ 4.2 Administration of the Contract

§ 4.2.1 The Architect will provide administration of the Contract as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect issues the final Certificate for Payment. The Architect will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

§ 4.2.2 The Architect will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work completed, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. However, the Architect will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect will not have control over, charge of, or responsibility for the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

§ 4.2.2.1 The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for additional site visits attributable to the fault, neglect or unnecessary request of the Contractor.

§ 4.2.3 On the basis of the site visits, the Architect will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and promptly report to the Owner (1) known deviations from the Contract Documents, (2) known deviations from the most recent construction schedule submitted by the Contractor, and (3) defects and deficiencies observed in the Work. The Architect will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect will not have control over or charge of, and will not be responsible for acts or omissions of, the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

§ 4.2.4 Communications

The Owner and Contractor shall include the Architect in all communications that relate to or affect the Architect's services or professional responsibilities. The Owner shall promptly notify the Architect of the substance of any direct communications between the Owner and the Contractor otherwise relating to the Project. Communications by and with the Architect's consultants shall be through the Architect. Communications by and with Subcontractors and suppliers shall be through the Contractor. Communications by and with Separate Contractors shall be through the Owner. The Contract Documents may specify other communication protocols.

§ 4.2.4.1 The Architect, at their discretion, will utilize the Architect's Project Management Software for communications during the Project. This system is a web based data transfer tool which all contractors will be required to utilize for the transfer of information. This system will be utilized for Submittals, Requests for Information, Architect Supplemental Instructions, Change Orders, Construction Change Directives, Pay Applications and other communications required during Contract Administration.

§ 4.2.5 Based on the Architect's evaluations of the Contractor's Applications for Payment, the Architect will review and certify the amounts due the Contractor and will issue Certificates for Payment in such amounts.

§ 4.2.6 The Architect has authority to reject Work that does not conform to the Contract Documents. Whenever the Architect considers it necessary or advisable, the Architect will have authority to require inspection or testing of the Work in accordance with Sections 13.4.2 and 13.4.3, whether or not the Work is fabricated, installed or completed. However, neither this authority of the Architect nor a decision made in good faith either to exercise or not to exercise such authority shall give rise to a duty or responsibility of the Architect to the Contractor, Subcontractors, suppliers, their agents or employees, or other persons or entities performing portions of the Work.

§ 4.2.7 The Architect will review and approve, or take other appropriate action upon, the Contractor's submittals such as Shop Drawings, Product Data, and Samples, but only for the limited purpose of checking for conformance with information given and the design concept expressed in the Contract Documents. The Architect's action will be taken in accordance with the submittal schedule approved by the Architect or, in the absence of an approved submittal schedule, with reasonable promptness while allowing sufficient time in the Architect's professional judgment to permit adequate review. Review of such submittals is not conducted for the purpose of determining the accuracy and completeness of other details such as dimensions and quantities, or for substantiating instructions for installation or performance of equipment or systems, all of which remain the responsibility of the Contractor as required by the

Init.

Contract Documents. The Architect's review of the Contractor's submittals shall not relieve the Contractor of the obligations under Sections 3.3, 3.5, and 3.12. The Architect's review shall not constitute approval of safety precautions or of any construction means, methods, techniques, sequences, or procedures. The Architect's approval of a specific item shall not indicate approval of an assembly of which the item is a component.

§ 4.2.8 The Architect will prepare Change Orders and Construction Change Directives, and may order minor changes in the Work as provided in Section 7.4. The Architect will investigate and make determinations and recommendations regarding concealed and unknown conditions as provided in Section 3.7.4.

§ 4.2.9 The Architect will conduct inspections to determine the date or dates of Substantial Completion and the date of final completion; issue Certificates of Substantial Completion pursuant to Section 9.8; receive and forward to the Owner, for the Owner's review and records, written warranties and related documents required by the Contract and assembled by the Contractor pursuant to Section 9.10; and issue a final Certificate for Payment pursuant to Section 9.10.

§ 4.2.10 If the Owner and Architect agree, the Architect will provide one or more Project representatives to assist in carrying out the Architect's responsibilities at the site. The Owner shall notify the Contractor of any change in the duties, responsibilities and limitations of authority of the Project representatives.

§ 4.2.11 The Architect will interpret and decide matters concerning performance under, and requirements of, the Contract Documents on written request of either the Owner or Contractor. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness.

§ 4.2.12 Interpretations and decisions of the Architect will be consistent with the intent of, and reasonably inferable from, the Contract Documents and will be in writing or in the form of drawings. When making such interpretations and decisions, the Architect will endeavor to secure faithful performance by both Owner and Contractor, will not show partiality to either, and will not be liable for results of interpretations or decisions rendered in good faith.

§ 4.2.13 The Architect's decisions on matters relating to aesthetic effect will be final if consistent with the intent expressed in the Contract Documents.

§ 4.2.14 The Architect will review and respond to requests for information about the Contract Documents. The Architect's response to such requests will be made in writing within any time limits agreed upon or otherwise with reasonable promptness. If appropriate, the Architect will prepare and issue supplemental Drawings and Specifications in response to the requests for information.

ARTICLE 5 SUBCONTRACTORS

§ 5.1 Definitions

§ 5.1.1 A Subcontractor is a person or entity who has a direct contract with the Contractor to perform a portion of the Work at the site **or to supply materials, equipment, or services in the furtherance of the work**. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a Separate Contractor or the subcontractors of a Separate Contractor.

§ 5.1.2 A Sub-subcontractor is a person or entity **regardless of tier** who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site **or to supply materials, equipment, or services in the furtherance of the work**. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

§ 5.2 Award of Subcontracts and Other Contracts for Portions of the Work

§ 5.2.1 Unless otherwise stated in the Contract Documents, the Contractor, as soon as practicable after award of the Contract, shall notify the Owner and Architect of the persons or entities proposed for each principal portion of the Work, including those who are to furnish materials or equipment fabricated to a special design. Within 14 days of receipt of the information, the Architect may notify the Contractor whether the Owner or the Architect (1) has reasonable objection to any such proposed person or entity or (2) requires additional time for review. Failure of the Architect to provide notice within the 14-day period shall constitute notice of no reasonable objection.

§ 5.2.2 The Contractor shall not contract with a proposed person or entity to whom the Owner or Architect has made reasonable and timely objection. The Contractor shall not be required to contract with anyone to whom the Contractor has made reasonable objection.

§ 5.2.3 If the Owner or Architect has reasonable objection to a person or entity proposed by the Contractor, the Contractor shall propose another to whom the Owner or Architect has no reasonable objection. If the proposed but rejected Subcontractor was reasonably capable of performing the Work, the Contract Sum and Contract Time shall be increased or decreased by the difference, if any, occasioned by such change, and an appropriate Change Order shall be issued before commencement of the substitute Subcontractor's Work. However, no increase in the Contract Sum or Contract Time shall be allowed for such change unless the Contractor has acted promptly and responsively in submitting names as required.

§ 5.2.4 The Contractor shall not substitute a Subcontractor, person, or entity for one previously selected if the Owner or Architect makes reasonable objection to such substitution.

§ 5.3 Subcontractual Relations

By appropriate written agreement, the Contractor shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by terms of the Contract Documents, and to assume toward the Contractor all the obligations and responsibilities, including the responsibility for safety of the Subcontractor's Work that the Contractor, by these Contract Documents, assumes toward the Owner and Architect. Each subcontract agreement shall preserve and protect the rights of the Owner and Architect under the Contract Documents with respect to the Work to be performed by the Subcontractor so that subcontracting thereof will not prejudice such rights, and shall allow to the Subcontractor, unless specifically provided otherwise in the subcontract agreement, the benefit of all rights, remedies, and redress against the Contractor that the Contractor, by the Contract Documents, has against the Owner. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with Sub-subcontractors. The Contractor shall make available to each proposed Subcontractor, prior to the execution of the subcontract agreement, copies of the Contract Documents to which the Subcontractor will be bound, and, upon written request of the Subcontractor, identify to the Subcontractor terms and conditions of the proposed subcontract agreement that may be at variance with the Contract Documents. Subcontractors will similarly make copies of applicable portions of such documents available to their respective proposed Sub-subcontractors.

§ 5.4 Contingent Assignment of Subcontracts

§ 5.4.1 Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that

- .1 assignment is effective only after termination of the Contract by the Owner for cause pursuant to Section 14.2 and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor; and
- .2 assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Contract.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract.

§ 5.4.2 Upon such assignment, if the Work has been suspended for more than 30 days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension.

§ 5.4.3 Upon assignment to the Owner under this Section 5.4, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE 6 CONSTRUCTION BY OWNER OR BY SEPARATE CONTRACTORS

§ 6.1 Owner's Right to Perform Construction and to Award Separate Contracts

§ 6.1.1 The term "Separate Contractor(s)" shall mean other contractors retained by the Owner under separate agreements. The Owner reserves the right to perform construction or operations related to the Project with the Owner's own forces, and with Separate Contractors retained under Conditions of the Contract substantially similar to those of this Contract, including those provisions of the Conditions of the Contract related to insurance and waiver of subrogation.

Init.

/

§ 6.1.2 When separate contracts are awarded for different portions of the Project or other construction or operations on the site, the term "Contractor" in the Contract Documents in each case shall mean the Contractor who executes each separate Owner-Contractor Agreement.

§ 6.1.3 The Owner shall provide for coordination of the activities of the Owner's own forces and of each Separate Contractor with the Work of the Contractor, who shall cooperate with them. The Contractor shall participate with any Separate Contractors and the Owner in reviewing their construction schedules. The Contractor shall make any revisions to its construction schedule deemed necessary after a joint review and mutual agreement. The construction schedules shall then constitute the schedules to be used by the Contractor, Separate Contractors, and the Owner until subsequently revised.

§ 6.1.4 Unless otherwise provided in the Contract Documents, when the Owner performs construction or operations related to the Project with the Owner's own forces or with Separate Contractors, the Owner or its Separate Contractors shall have the same obligations and rights that the Contractor has under the Conditions of the Contract, including, without excluding others, those stated in Article 3, this Article 6, and Articles 10, 11, and 12.

§ 6.2 Mutual Responsibility

§ 6.2.1 The Contractor shall afford the Owner and Separate Contractors reasonable opportunity for introduction and storage of their materials and equipment and performance of their activities, and shall connect and coordinate the Contractor's construction and operations with theirs as required by the Contract Documents.

§ 6.2.2 If part of the Contractor's Work depends for proper execution or results upon construction or operations by the Owner or a Separate Contractor, the Contractor shall, prior to proceeding with that portion of the Work, promptly notify the Architect of apparent discrepancies or defects in the construction or operations by the Owner or Separate Contractor that would render it unsuitable for proper execution and results of the Contractor's Work. Failure of the Contractor to notify the Architect of apparent discrepancies or defects prior to proceeding with the Work shall constitute an acknowledgment that the Owner's or Separate Contractor's completed or partially completed construction is fit and proper to receive the Contractor's Work. The Contractor shall not be responsible for discrepancies or defects in the construction or operations by the Owner or Separate Contractor that are not apparent.

§ 6.2.3 The Contractor shall reimburse the Owner for costs the Owner incurs that are payable to a Separate Contractor because of the Contractor's delays, improperly timed activities or defective construction. The Owner shall be responsible to the Contractor for costs the Contractor incurs because of a Separate Contractor's delays, improperly timed activities, damage to the Work or defective construction.

§ 6.2.4 The Contractor shall promptly remedy damage that the Contractor wrongfully causes to completed or partially completed construction or to property of the Owner or Separate Contractor as provided in Section 10.2.5.

§ 6.2.5 The Owner and each Separate Contractor shall have the same responsibilities for cutting and patching as are described for the Contractor in Section 3.14.

§ 6.3 Owner's Right to Clean Up

If a dispute arises among the Contractor, Separate Contractors, and the Owner as to the responsibility under their respective contracts for maintaining the premises and surrounding area free from waste materials and rubbish, the Owner may clean up and the Architect will allocate the cost among those responsible.

ARTICLE 7 CHANGES IN THE WORK

§ 7.1 General

§ 7.1.1 Changes in the Work may be accomplished after execution of the Contract, and without invalidating the Contract, by Change Order, Construction Change Directive or order for a minor change in the Work, subject to the limitations stated in this Article 7 and elsewhere in the Contract Documents.

§ 7.1.2 A Change Order shall be based upon agreement among the Owner, Contractor, and Architect. A Construction Change Directive requires agreement by the Owner and Architect and may or may not be agreed to by the Contractor. An order for a minor change in the Work may be issued by the Architect alone.

§ 7.1.3 Changes in the Work shall be performed under applicable provisions of the Contract Documents. The Contractor shall proceed promptly with changes in the Work, unless otherwise provided in the Change Order, Construction Change Directive, or order for a minor change in the Work.

§ 7.2 Change Orders

§ 7.2.1 A Change Order is a written instrument prepared by the Architect and signed by the Owner, Contractor, and Architect stating their agreement upon all of the following:

- .1 The change in the Work;
- .2 The amount of the adjustment, if any, in the Contract Sum; and
- .3 The extent of the adjustment, if any, in the Contract Time.

§ 7.3 Construction Change Directives

§ 7.3.1 A Construction Change Directive is a written order prepared by the Architect and signed by the Owner and Architect, directing a change in the Work prior to agreement on adjustment, if any, in the Contract Sum or Contract Time, or both. The Owner may by Construction Change Directive, without invalidating the Contract, order changes in the Work within the general scope of the Contract consisting of additions, deletions, or other revisions, the Contract Sum and Contract Time being adjusted accordingly.

§ 7.3.2 A Construction Change Directive shall be used in the absence of total agreement on the terms of a Change Order.

§ 7.3.3 If the Construction Change Directive provides for an adjustment to the Contract Sum, the adjustment shall be based on one of the following methods:

- .1 Mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation;
- .2 Unit prices stated in the Contract Documents or subsequently agreed upon;
- .3 Cost to be determined in a manner agreed upon by the parties and a mutually acceptable fixed or percentage fee; or
- .4 As provided in Section 7.3.4.

§ 7.3.4 If the Contractor does not respond promptly or disagrees with the method for adjustment in the Contract Sum, the Architect shall determine the adjustment on the basis of reasonable expenditures and savings of those performing the Work attributable to the change, including, in case of an increase in the Contract Sum, an amount for overhead and profit as set forth in the Agreement, or if no such amount is set forth in the Agreement, a reasonable amount. In such case, and also under Section 7.3.3.3, the Contractor shall keep and present, in such form as the Architect may prescribe, an itemized accounting together with appropriate supporting data. Unless otherwise provided in the Contract Documents, costs for the purposes of this Section 7.3.4 shall be limited to the following:

- .1 Costs of labor, including applicable payroll taxes, fringe benefits required by agreement or custom, workers' compensation insurance, and other employee costs approved by the Architect;
- .2 Costs of materials, supplies, and equipment, including cost of transportation, whether incorporated or consumed;
- .3 Rental costs of machinery and equipment, exclusive of hand tools, whether rented from the Contractor or others;
- .4 Costs of premiums for all bonds and insurance, permit fees, and sales, use, or similar taxes, directly related to the change; and
- .5 Costs of supervision and field office personnel directly attributable to the change.

§ 7.3.5 If the Contractor disagrees with the adjustment in the Contract Time, the Contractor may make a Claim in accordance with applicable provisions of Article 15.

§ 7.3.6 Upon receipt of a Construction Change Directive, the Contractor shall promptly proceed with the change in the Work involved and advise the Architect of the Contractor's agreement or disagreement with the method, if any, provided in the Construction Change Directive for determining the proposed adjustment in the Contract Sum or Contract Time.

§ 7.3.7 A Construction Change Directive signed by the Contractor indicates the Contractor's agreement therewith, including adjustment in Contract Sum and Contract Time or the method for determining them. Such agreement shall be effective immediately and shall be recorded as a Change Order.

§ 7.3.8 The amount of credit to be allowed by the Contractor to the Owner for a deletion or change that results in a net decrease in the Contract Sum shall be actual net cost as confirmed by the Architect. When both additions and credits covering related Work or substitutions are involved in a change, the allowance for overhead and profit shall be figured on the basis of net increase, if any, with respect to that change.

§ 7.3.9 Pending final determination of the total cost of a Construction Change Directive to the Owner, the Contractor may request payment for Work completed under the Construction Change Directive in Applications for Payment. The Architect will make an interim determination for purposes of monthly certification for payment for those costs and certify for payment the amount that the Architect determines, in the Architect's professional judgment, to be reasonably justified. The Architect's interim determination of cost shall adjust the Contract Sum on the same basis as a Change Order, subject to the right of either party to disagree and assert a Claim in accordance with Article 15.

§ 7.3.10 When the Owner and Contractor agree with a determination made by the Architect concerning the adjustments in the Contract Sum and Contract Time, or otherwise reach agreement upon the adjustments, such agreement shall be effective immediately and the Architect will prepare a Change Order. Change Orders may be issued for all or any part of a Construction Change Directive.

VERIFY WITH OWNER AND CONFIRM PERCENTAGES TO BE ALLOWED

§ 7.3.11 In subparagraph 7.3.4, the allowance for the combined overhead and profit included in the total cost to the Owner shall be based on the following schedule:

- .1 For the Contractor, for Work performed by the Contractor's own forces, **10** percent of the cost.
- .2 For the Contractor, for Work performed by the Contractor's subcontractor, **5** percent of the amount due the subcontractor.
- .3 Cost to which overhead and profit is to be applied shall be determined in accordance with subparagraph 7.3.4.
- .4 In order to facilitate checking of quotations for extras or credits, all proposals, except those so minor that their propriety can be seen by inspection, shall be accompanied by a complete itemization of costs including labor, materials and subcontract. Labor and materials shall be itemized in the manner prescribed above. Where major cost items are subcontracts, they shall be itemized.

§ 7.4 Minor Changes in the Work

The Architect may order minor changes in the Work that are consistent with the intent of the Contract Documents and do not involve an adjustment in the Contract Sum or an extension of the Contract Time. The Architect's order for minor changes shall be in writing. If the Contractor believes that the proposed minor change in the Work will affect the Contract Sum or Contract Time, the Contractor shall notify the Architect and shall not proceed to implement the change in the Work. If the Contractor performs the Work set forth in the Architect's order for a minor change without prior notice to the Architect that such change will affect the Contract Sum or Contract Time, the Contractor waives any adjustment to the Contract Sum or extension of the Contract Time.

§ 7.4.1 If the Contractor reasonably believes that it would be entitled to an adjustment of the Contract Sum, Contract Time, or both, on account of an order for a minor change in the Work, the Contractor shall promptly give the Owner and Architect written notice of the Contractor's position, and not proceed with the subject Work without first receiving a Construction Change Directive or Change Order related to it. The Contractor's commencement of Work pursuant to an order for a minor change in the Work shall irrevocably signify the Contractor's that it is not entitled to an adjustment of the Contract Sum or Contract Time on account of such order.

ARTICLE 8 TIME

§ 8.1 Definitions

§ 8.1.1 Unless otherwise provided, Contract Time is the period of time, including authorized adjustments, allotted in the Contract Documents for Substantial Completion of the Work.

Init.

/

§ 8.1.2 The date of commencement of the Work is the date established in the Agreement.

§ 8.1.3 The date of Substantial Completion is the date certified by the Architect in accordance with Section 9.8.

§ 8.1.4 The term "day" as used in the Contract Documents shall mean calendar day unless otherwise specifically defined.

§ 8.2 Progress and Completion

§ 8.2.1 Time limits stated in the Contract Documents are of the essence of the Contract. By executing the Agreement, the Contractor confirms that the Contract Time is a reasonable period for performing the Work.

§ 8.2.2 The Contractor shall not knowingly, except by agreement or instruction of the Owner in writing, commence the Work prior to the effective date of insurance required to be furnished by the Contractor and Owner.

§ 8.2.3 The Contractor shall proceed expeditiously with adequate forces and shall achieve Substantial Completion within the Contract Time.

§ 8.3 Delays and Extensions of Time

§ 8.3.1 If the Contractor is delayed at any time in the commencement or progress of the Work by (1) an act or neglect of the Owner or Architect, of an employee of either, or of a Separate Contractor; (2) by changes ordered in the Work; (3) by labor disputes, fire, unusual delay in deliveries, unavoidable casualties, adverse weather conditions documented in accordance with Section 15.1.6.2, or other causes beyond the Contractor's control; (4) by delay authorized by the Owner pending mediation and binding dispute resolution; or (5) by other causes that the Contractor asserts, and the Architect determines, justify delay, then the Contract Time shall be extended for such reasonable time as the Architect may determine.

§ 8.3.2 Claims relating to time shall be made in accordance with applicable provisions of Article 15.

§ 8.3.3 This Section 8.3 does not preclude recovery of damages for delay by either party under other provisions of the Contract Documents.

ARTICLE 9 PAYMENTS AND COMPLETION

§ 9.1 Contract Sum

§ 9.1.1 The Contract Sum is stated in the Agreement and, including authorized adjustments, is the total amount payable by the Owner to the Contractor for performance of the Work under the Contract Documents.

§ 9.1.2 If unit prices are stated in the Contract Documents or subsequently agreed upon, and if quantities originally contemplated are materially changed so that application of such unit prices to the actual quantities causes substantial inequity to the Owner or Contractor, the applicable unit prices shall be equitably adjusted.

§ 9.2 Schedule of Values

Where the Contract is based on a stipulated sum or Guaranteed Maximum Price, the Contractor shall submit a schedule of values to the Architect before the first Application for Payment, allocating the entire Contract Sum to the various portions of the Work. The schedule of values shall be prepared in the form, and supported by the data to substantiate its accuracy, required by the Architect. This schedule, unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's Applications for Payment. Any changes to the schedule of values shall be submitted to the Architect and supported by such data to substantiate its accuracy as the Architect may require, and unless objected to by the Architect, shall be used as a basis for reviewing the Contractor's subsequent Applications for Payment.

§ 9.2.1 The schedule of values shall be completed using AIA Document G703, Certificate for Payment, Continuation Sheet.

§ 9.3 Applications for Payment

§ 9.3.1 At least ten days before the date established for each progress payment, the Contractor shall submit to the Architect an itemized Application for Payment prepared in accordance with the schedule of values, if required under

Init.

/

Section 9.2, for completed portions of the Work. The application shall be notarized, if required, and supported by all data substantiating the Contractor's right to payment that the Owner or Architect require, such as copies of requisitions, and releases and waivers of liens from Subcontractors and suppliers, and shall reflect retainage if provided for in the Contract Documents.

§ 9.3.1.1 As provided in Section 7.3.9, such applications may include requests for payment on account of changes in the Work that have been properly authorized by Construction Change Directives, or by interim determinations of the Architect, but not yet included in Change Orders.

§ 9.3.1.2 Applications for Payment shall not include requests for payment for portions of the Work for which the Contractor does not intend to pay a Subcontractor or supplier, unless such Work has been performed by others whom the Contractor intends to pay.

VERIFY RETAINAGE WITH OWNER

§ 9.3.1.3 ALT1 – Until the Work is 50% complete as determined by the Architect and Owner, the Owner shall withhold 10% for retainage and shall pay 90% of the amount due the Contractor on account of progress payments, minus such additional amounts as may be determined by Owner to be necessary for any unresolved claims or change orders. Subsequent payments shall not include additional retainage. Upon Final Completion the retainage shall be released minus said amounts necessary to complete the work or to resolve claims.

ALT2 – Until Final Completion, the Owner shall withhold 10% for retainage and shall pay 90% of the amount due the Contractor on account of progress payments, minus such additional amounts as may be determined by Owner to be necessary for any unresolved claims or change orders. Upon Final Completion the retainage shall be released minus said amounts necessary to complete the work or to resolve claims.

§ 9.3.2 Unless otherwise provided in the Contract Documents, payments shall be made on account of materials and equipment delivered and suitably stored at the site for subsequent incorporation in the Work. If approved in advance by the Owner, payment may similarly be made for materials and equipment suitably stored off the site at a location agreed upon in writing. Payment for materials and equipment stored on or off the site shall be conditioned upon compliance by the Contractor with procedures satisfactory to the Owner to establish the Owner's title to such materials and equipment or otherwise protect the Owner's interest, and shall include the costs of applicable insurance, storage, and transportation to the site, for such materials and equipment stored off the site.

§ 9.3.2.1 If advance approval is obtained for payment for off-site stored materials, the Contractor must furnish the Owner the following:

- .1 A list of the materials consigned to the project (which shall be clearly identified), giving the place of storage, together with copies of invoices and reasons why materials cannot be delivered to the site.
- .2 Certification that all items have been tagged for delivery to the project and that they will not be used for any other purpose.
- .3 A letter from the Bonding Company indicating agreement to the arrangements and that payment to the contractor shall not relieve either party of their responsibility to complete the facility.
- .4 Evidence of adequate insurance covering the material in storage.
- .5 Evidence that representative of the Architect and/or Owner have visited the Contractor's place of storage and checked all items on the Contractor's Certificate. They shall certify, insofar as possible that the items are in agreement with the specifications and approve their incorporation into the project.
- .6 Any costs incurred by the Architect and/or Owner to inspect materials in off-site storage shall be paid by the Contractor.

§ 9.3.3 The Contractor warrants that title to all Work covered by an Application for Payment will pass to the Owner no later than the time of payment. The Contractor further warrants that upon submittal of an Application for Payment all Work for which Certificates for Payment have been previously issued and payments received from the Owner shall, to the best of the Contractor's knowledge, information, and belief, be free and clear of liens, claims, security interests, or

encumbrances, in favor of the Contractor, Subcontractors, suppliers, or other persons or entities that provided labor, materials, and equipment relating to the Work.

§ 9.4 Certificates for Payment

§ 9.4.1 The Architect will, within seven days after receipt of the Contractor's Application for Payment, either (1) issue to the Owner a Certificate for Payment in the full amount of the Application for Payment, with a copy to the Contractor; or (2) issue to the Owner a Certificate for Payment for such amount as the Architect determines is properly due, and notify the Contractor and Owner of the Architect's reasons for withholding certification in part as provided in Section 9.5.1; or (3) withhold certification of the entire Application for Payment, and notify the Contractor and Owner of the Architect's reason for withholding certification in whole as provided in Section 9.5.1.

§ 9.4.2 The issuance of a Certificate for Payment will constitute a representation by the Architect to the Owner, based on the Architect's evaluation of the Work and the data in the Application for Payment, that, to the best of the Architect's knowledge, information, and belief, the Work has progressed to the point indicated, the quality of the Work is in accordance with the Contract Documents, and that the Contractor is entitled to payment in the amount certified. The foregoing representations are subject to an evaluation of the Work for conformance with the Contract Documents upon Substantial Completion, to results of subsequent tests and inspections, to correction of minor deviations from the Contract Documents prior to completion, and to specific qualifications expressed by the Architect. However, the issuance of a Certificate for Payment will not be a representation that the Architect has (1) made exhaustive or continuous on-site inspections to check the quality or quantity of the Work; (2) reviewed construction means, methods, techniques, sequences, or procedures; (3) reviewed copies of requisitions received from Subcontractors and suppliers and other data requested by the Owner to substantiate the Contractor's right to payment; or (4) made examination to ascertain how or for what purpose the Contractor has used money previously paid on account of the Contract Sum.

§ 9.5 Decisions to Withhold Certification

§ 9.5.1 The Architect may withhold a Certificate for Payment in whole or in part, to the extent reasonably necessary to protect the Owner, if in the Architect's opinion the representations to the Owner required by Section 9.4.2 cannot be made. If the Architect is unable to certify payment in the amount of the Application, the Architect will notify the Contractor and Owner as provided in Section 9.4.1. If the Contractor and Architect cannot agree on a revised amount, the Architect will promptly issue a Certificate for Payment for the amount for which the Architect is able to make such representations to the Owner. The Architect may also withhold a Certificate for Payment or, because of subsequently discovered evidence, may nullify the whole or a part of a Certificate for Payment previously issued, to such extent as may be necessary in the Architect's opinion to protect the Owner from loss for which the Contractor is responsible, including loss resulting from acts and omissions described in Section 3.3.2, because of

- .1 defective Work not remedied;
- .2 third party claims filed or reasonable evidence indicating probable filing of such claims, unless security acceptable to the Owner is provided by the Contractor;
- .3 failure of the Contractor to make payments properly to Subcontractors or suppliers for labor, materials or equipment;
- .4 reasonable evidence that the Work cannot be completed for the unpaid balance of the Contract Sum;
- .5 damage to the Owner or a Separate Contractor;
- .6 reasonable evidence that the Work will not be completed within the Contract Time, and that the unpaid balance would not be adequate to cover actual or liquidated damages for the anticipated delay; or
- .7 repeated failure to carry out the Work in accordance with the Contract Documents.

§ 9.5.2 When either party disputes the Architect's decision regarding a Certificate for Payment under Section 9.5.1, in whole or in part, that party may submit a Claim in accordance with Article 15.

§ 9.5.3 When the reasons for withholding certification are removed, certification will be made for amounts previously withheld.

§ 9.5.4 If the Architect withholds certification for payment under Section 9.5.1.3, the Owner may, at its sole option, issue joint checks to the Contractor and to any Subcontractor or supplier to whom the Contractor failed to make payment for Work properly performed or material or equipment suitably delivered. If the Owner makes payments by joint check, the Owner shall notify the Architect and the Contractor shall reflect such payment on its next Application for Payment.

§ 9.6 Progress Payments

§ 9.6.1 After the Architect has issued a Certificate for Payment, the Owner shall make payment in the manner and within the time provided in the Contract Documents, and shall so notify the Architect.

§ 9.6.2 The Contractor shall pay each Subcontractor, no later than seven days after receipt of payment from the Owner, the amount to which the Subcontractor is entitled, reflecting percentages actually retained from payments to the Contractor on account of the Subcontractor's portion of the Work. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to Sub-subcontractors in a similar manner.

§ 9.6.3 The Architect will, on request, furnish to a Subcontractor, if practicable, information regarding percentages of completion or amounts applied for by the Contractor and action taken thereon by the Architect and Owner on account of portions of the Work done by such Subcontractor.

§ 9.6.4 The Owner has the right to request written evidence from the Contractor that the Contractor has properly paid Subcontractors and suppliers amounts paid by the Owner to the Contractor for subcontracted Work. If the Contractor fails to furnish such evidence within seven days, the Owner shall have the right to contact Subcontractors and suppliers to ascertain whether they have been properly paid. Neither the Owner nor Architect shall have an obligation to pay, or to see to the payment of money to, a Subcontractor or supplier, except as may otherwise be required by law.

§ 9.6.5 The Contractor's payments to suppliers shall be treated in a manner similar to that provided in Sections 9.6.2, 9.6.3 and 9.6.4.

§ 9.6.6 A Certificate for Payment, a progress payment, or partial or entire use or occupancy of the Project by the Owner shall not constitute acceptance of Work not in accordance with the Contract Documents.

§ 9.6.7 Unless the Contractor provides the Owner with a payment bond in the full penal sum of the Contract Sum, payments received by the Contractor for Work properly performed by Subcontractors or provided by suppliers shall be held by the Contractor for those Subcontractors or suppliers who performed Work or furnished materials, or both, under contract with the Contractor for which payment was made by the Owner. Nothing contained herein shall require money to be placed in a separate account and not commingled with money of the Contractor, create any fiduciary liability or tort liability on the part of the Contractor for breach of trust, or entitle any person or entity to an award of punitive damages against the Contractor for breach of the requirements of this provision.

§ 9.6.8 Provided the Owner has fulfilled its payment obligations under the Contract Documents, the Contractor shall defend and indemnify the Owner from all loss, liability, damage or expense, including reasonable attorney's fees and litigation expenses, arising out of any lien claim or other claim for payment by any Subcontractor or supplier of any tier. Upon receipt of notice of a lien claim or other claim for payment, the Owner shall notify the Contractor. If approved by the applicable court, when required, the Contractor may substitute a surety bond for the property against which the lien or other claim for payment has been asserted.

§ 9.7 Failure of Payment

If the Architect does not issue a Certificate for Payment, through no fault of the Contractor, within seven days after receipt of the Contractor's Application for Payment, or if the Owner does not pay the Contractor within seven days after the date established in the Contract Documents, the amount certified by the Architect or awarded by binding dispute resolution, then the Contractor may, upon seven additional days' notice to the Owner and Architect, stop the Work until payment of the amount owing has been received. The Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable costs of shutdown, delay and start-up, plus interest as provided for in the Contract Documents.

§ 9.7.1 Contractor shall have no right to stop work for failure of payment by the Owner, for portions of the Work requested on the Application for Payment, if the Owner or Architect has notified the Contractor that the said portion of the Work is defective.

§ 9.8 Substantial Completion

§ 9.8.1 Substantial Completion is the stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for

Init.

its intended use **and all occupancy or other permits have been issued in connection with the Work completed by Contractor. Unless otherwise agreed to by the Owner, substantial completion will not be granted until all closeout submittals and procedures, including but not limited to, all warranty documents, operation and maintenance manuals, and As-Built records have been provided to and accepted by the Owner.**

§ 9.8.2 When the Contractor considers that the Work, or a portion thereof which the Owner agrees to accept separately, is substantially complete, the Contractor shall prepare and submit to the Architect a comprehensive list of items to be completed or corrected prior to final payment. Failure to include an item on such list does not alter the responsibility of the Contractor to complete all Work in accordance with the Contract Documents.

INCLUDE ONLY WITH CONSENT OF OWNER

§ 9.8.2.1 **Except with the consent of the Owner, the Architect will perform no more than three (3) inspections to determine whether the Work or a designated portion thereof has attained Substantial Completion in accordance with the Contract Documents. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for any additional inspections.**

§ 9.8.3 Upon receipt of the Contractor's list, the Architect will make an inspection to determine whether the Work or designated portion thereof is substantially complete. If the Architect's inspection discloses any item, whether or not included on the Contractor's list, which is not sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work or designated portion thereof for its intended use, the Contractor shall, before issuance of the Certificate of Substantial Completion, complete or correct such item upon notification by the Architect. In such case, the Contractor shall then submit a request for another inspection by the Architect to determine Substantial Completion.

§ 9.8.4 When the Work or designated portion thereof is substantially complete, the Architect will prepare a Certificate of Substantial Completion that shall establish the date of Substantial Completion; establish responsibilities of the Owner and Contractor for security, maintenance, heat, utilities, damage to the Work and insurance; and fix the time within which the Contractor shall finish all items on the list accompanying the Certificate. Warranties required by the Contract Documents shall commence on the date of Substantial Completion of the Work or designated portion thereof unless otherwise provided in the Certificate of Substantial Completion.

§ 9.8.5 The Certificate of Substantial Completion shall be submitted to the Owner and Contractor for their written acceptance of responsibilities assigned to them in the Certificate. Upon such acceptance, and consent of surety if any, the Owner shall make payment of retainage applying to the Work or designated portion thereof. Such payment shall be adjusted for Work that is incomplete or not in accordance with the requirements of the Contract Documents.

§ 9.9 Partial Occupancy or Use

§ 9.9.1 The Owner may occupy or use any completed or partially completed portion of the Work at any stage when such portion is designated by separate agreement with the Contractor, provided such occupancy or use is consented to by the insurer and authorized by public authorities having jurisdiction over the Project. Such partial occupancy or use may commence whether or not the portion is substantially complete, provided the Owner and Contractor have accepted in writing the responsibilities assigned to each of them for payments, retainage, if any, security, maintenance, heat, utilities, damage to the Work and insurance, and have agreed in writing concerning the period for correction of the Work and commencement of warranties required by the Contract Documents. When the Contractor considers a portion substantially complete, the Contractor shall prepare and submit a list to the Architect as provided under Section 9.8.2. Consent of the Contractor to partial occupancy or use shall not be unreasonably withheld. The stage of the progress of the Work shall be determined by written agreement between the Owner and Contractor or, if no agreement is reached, by decision of the Architect.

§ 9.9.2 Immediately prior to such partial occupancy or use, the Owner, Contractor, and Architect shall jointly inspect the area to be occupied or portion of the Work to be used in order to determine and record the condition of the Work.

§ 9.9.3 Unless otherwise agreed upon, partial occupancy or use of a portion or portions of the Work shall not constitute acceptance of Work not complying with the requirements of the Contract Documents.

§ 9.10 Final Completion and Final Payment

§ 9.10.1 Upon receipt of the Contractor's notice that the Work is ready for final inspection and acceptance and upon receipt of a final Application for Payment, the Architect will promptly make such inspection. When the Architect finds the Work acceptable under the Contract Documents and the Contract fully performed, the Architect will promptly issue a final Certificate for Payment stating that to the best of the Architect's knowledge, information and belief, and on the basis of the Architect's on-site visits and inspections, the Work has been completed in accordance with the Contract Documents and that the entire balance found to be due the Contractor and noted in the final Certificate is due and payable. The Architect's final Certificate for Payment will constitute a further representation that conditions listed in Section 9.10.2 as precedent to the Contractor's being entitled to final payment have been fulfilled.

§ 9.10.1.1 **Except with the consent of the Owner, the Architect will perform no more than three (3) inspections to determine whether the Work or a designated portion thereof has attained Final Completion in accordance with the Contract Documents. The Owner shall be entitled to deduct from the Contract Sum amounts paid to the Architect for any additional inspections.**

§ 9.10.2 Neither final payment nor any remaining retained percentage shall become due until the Contractor submits to the Architect (1) an affidavit that payrolls, bills for materials and equipment, and other indebtedness connected with the Work for which the Owner or the Owner's property might be responsible or encumbered (less amounts withheld by Owner) have been paid or otherwise satisfied, (2) a certificate evidencing that insurance required by the Contract Documents to remain in force after final payment is currently in effect, (3) a written statement that the Contractor knows of no reason that the insurance will not be renewable to cover the period required by the Contract Documents, (4) consent of surety, if any, to final payment, (5) documentation of any special warranties, such as manufacturers' warranties or specific Subcontractor warranties, and (6) if required by the Owner **(7) a final lien waiver from the Contractor; (8) all maintenance and operating instructions, schedules, guarantees, bonds, certificates of inspection, record documents, and other documents required by the Contract Documents; and (9) all of the document and information required under Paragraph 9.3 to be included with Applications for Payment, and, (10),** other data establishing payment or satisfaction of obligations, such as receipts and releases and waivers of liens, claims, security interests, or encumbrances arising out of the Contract, to the extent and in such form as may be designated by the Owner. If a Subcontractor refuses to furnish a release or waiver required by the Owner, the Contractor may furnish a bond satisfactory to the Owner to indemnify the Owner against such lien, claim, security interest, or encumbrance. If a lien, claim, security interest, or encumbrance remains unsatisfied after payments are made, the Contractor shall refund to the Owner all money that the Owner may be compelled to pay in discharging the lien, claim, security interest, or encumbrance, including all costs and reasonable attorneys' fees.

§ 9.10.2.1 **Waiver of Liens shall be submitted to the Owner by the Contractor and all sub-contractors and material suppliers including, but not limited to those who have served a Notice of Furnishing to the Owners. If no Notice of Furnishing has been served in the time allotted then all lien rights will be forfeited as per State of Ohio law. At Owner's request Contractor will deliver to Owner such lien releases, waivers as the Owner may require in order to verify that all the Work is free of liens and all lien rights that may be claimed by any person or entity that has performed work or provided materials in connection with the Work.**

§ 9.10.2.2 **Owner may withhold from final payment one and one half times the cost or amount of unresolved liens and/or claims. If Contractor fails to obtain a release of mechanics lien or claim against the Owner by a subcontractor, materialmen, or lateness of Contractor or party claiming through such; Owner may upon 10 days notice pay such liens or claims without any responsibility for evaluating its validity and notwithstanding any assertion by the Contractor to the contrary, the Owner may assume the claim or lien to be valid. In any event, the Contractor shall indemnify and hold harmless the Owner from all expenses and loss (including reasonable attorney fees) arising out of or related to a lien or claim made by its subcontractors or materialmen.**

§ 9.10.3 If, after Substantial Completion of the Work, final completion thereof is materially delayed through no fault of the Contractor or by issuance of Change Orders affecting final completion, and the Architect so confirms, the Owner shall, upon application by the Contractor and certification by the Architect, and without terminating the Contract, make payment of the balance due for that portion of the Work fully completed, corrected, and accepted. If the remaining balance for Work not fully completed or corrected is less than retainage stipulated in the Contract Documents, and if bonds have been furnished, the written consent of the surety to payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the Contractor to the Architect prior to

certification of such payment. Such payment shall be made under terms and conditions governing final payment, except that it shall not constitute a waiver of Claims.

§ 9.10.4 The making of final payment shall constitute a waiver of Claims by the Owner except those arising from

- .1 liens, Claims, security interests, or encumbrances arising out of the Contract and unsettled;
- .2 failure of the Work to comply with the requirements of the Contract Documents;
- .3 terms of special warranties required by the Contract Documents; or
- .4 audits performed by the Owner, if permitted by the Contract Documents, after final payment.

§ 9.10.5 Acceptance of final payment by the Contractor, a Subcontractor, or a supplier, shall constitute a waiver of claims by that payee except those previously made in writing and identified by that payee as unsettled at the time of final Application for Payment.

ARTICLE 10 PROTECTION OF PERSONS AND PROPERTY

§ 10.1 Safety Precautions and Programs

The Contractor shall be responsible for initiating, maintaining, and supervising all safety precautions and programs in connection with the performance of the Contract.

§ 10.2 Safety of Persons and Property

§ 10.2.1 The Contractor shall take reasonable precautions for safety of, and shall provide reasonable protection to prevent damage, injury, or loss to

- .1 employees on the Work and other persons who may be affected thereby;
- .2 the Work and materials and equipment to be incorporated therein, whether in storage on or off the site, under care, custody, or control of the Contractor, a Subcontractor, or a Sub-subcontractor; and
- .3 other property at the site or adjacent thereto, such as trees, shrubs, lawns, walks, pavements, roadways, structures, and utilities not designated for removal, relocation, or replacement in the course of construction.

§ 10.2.2 The Contractor shall comply with, and give notices required by applicable laws, statutes, ordinances, codes, rules and regulations, and lawful orders of public authorities, bearing on safety of persons or property or their protection from damage, injury, or loss.

§ 10.2.3 The Contractor shall implement, erect, and maintain, as required by existing conditions and performance of the Contract, reasonable safeguards for safety and protection, including posting danger signs and other warnings against hazards; promulgating safety regulations; and notifying the owners and users of adjacent sites and utilities of the safeguards.

§ 10.2.4 When use or storage of explosives or other hazardous materials or equipment, or unusual methods are necessary for execution of the Work, the Contractor shall exercise utmost care and carry on such activities under supervision of properly qualified personnel.

§ 10.2.5 The Contractor shall promptly remedy damage and loss (other than damage or loss insured under property insurance required by the Contract Documents) to property referred to in Sections 10.2.1.2 and 10.2.1.3 caused in whole or in part by the Contractor, a Subcontractor, a Sub-subcontractor, or anyone directly or indirectly employed by any of them, or by anyone for whose acts they may be liable and for which the Contractor is responsible under Sections 10.2.1.2 and 10.2.1.3. The Contractor may make a Claim for the cost to remedy the damage or loss to the extent such damage or loss is attributable to acts or omissions of the Owner or Architect or anyone directly or indirectly employed by either of them, or by anyone for whose acts either of them may be liable, and not attributable to the fault or negligence of the Contractor. The foregoing obligations of the Contractor are in addition to the Contractor's obligations under Section 3.18.

§ 10.2.6 The Contractor shall designate a responsible member of the Contractor's organization at the site whose duty shall be the prevention of accidents. This person shall be the Contractor's superintendent unless otherwise designated by the Contractor in writing to the Owner and Architect.

§ 10.2.7 The Contractor shall not permit any part of the construction or site to be loaded so as to cause damage or create an unsafe condition.

Init.

/

§ 10.2.8 Injury or Damage to Person or Property

If either party suffers injury or damage to person or property because of an act or omission of the other party, or of others for whose acts such party is legally responsible, notice of the injury or damage, whether or not insured, shall be given to the other party within a reasonable time not exceeding 21 days after discovery. The notice shall provide sufficient detail to enable the other party to investigate the matter.

§ 10.2.8.1 Contractor shall indemnify and hold harmless the Owner from all expense and loss arising out of any failure to comply with the foregoing provisions and arising out of any injury to property or person, including death, where the Contractor, its subcontractor or its lower tiered subcontractors or materialmen violated any OSHA or other regulatory safety rules or procedures.

§ 10.2.8.2 The Contractor is required to promptly report in writing to the Owner all accidents whatsoever, arising out of or in connection with the performance of the Work, whether on or adjacent to the site, which cause death, personal injury or property damage, giving full details and statements of witnesses. Furthermore, if death or serious personal injuries or serious damages are caused, the accident shall be reported immediately by telephone or messenger to the Owner.

§ 10.2.8.3 Precautions shall be exercised at all times for the protection of persons and property. The safety provisions of applicable building and construction codes shall be observed. Machinery, equipment and hazards shall be guarded in accordance with the safety provisions of the Manual of Accident Prevention in Construction published by the Associated General Contractors of America, to the extent that such provisions are not inconsistent with applicable laws and regulations.

§ 10.2.8.4 The General Contractor shall provide, at the site, such equipment and medical facilities as are necessary to supply first aid service to anyone who may be injured in connection with the work.

§ 10.2.8.5 All work and materials shall be kept within the confines of the described property. During cold weather, the Contractor shall protect all work from damage. If low temperatures make it impossible to continue operations safely, in spite of cold weather precautions, the Contractor shall cease work and shall so notify the Owner. Any work damaged by failure to provide the protection required above shall be removed and replaced with new work at the Contractor's expense.

§ 10.3 Hazardous Materials and Substances

§ 10.3.1 The Contractor is responsible for compliance with any requirements included in the Contract Documents regarding hazardous materials or substances. If the Contractor encounters a hazardous material or substance not addressed in the Contract Documents and if reasonable precautions will be inadequate to prevent foreseeable bodily injury or death to persons resulting from a material or substance, including but not limited to asbestos or polychlorinated biphenyl (PCB), encountered on the site by the Contractor, the Contractor shall, upon recognizing the condition, immediately stop Work in the affected area and notify the Owner and Architect of the condition.

§ 10.3.2 Upon receipt of the Contractor's notice, the Owner shall obtain the services of a licensed laboratory to verify the presence or absence of the material or substance reported by the Contractor and, in the event such material or substance is found to be present, to cause it to be rendered harmless. Unless otherwise required by the Contract Documents, the Owner shall furnish in writing to the Contractor and Architect the names and qualifications of persons or entities who are to perform tests verifying the presence or absence of the material or substance or who are to perform the task of removal or safe containment of the material or substance. The Contractor and the Architect will promptly reply to the Owner in writing stating whether or not either has reasonable objection to the persons or entities proposed by the Owner. If either the Contractor or Architect has an objection to a person or entity proposed by the Owner, the Owner shall propose another to whom the Contractor and the Architect have no reasonable objection. When the material or substance has been rendered harmless, Work in the affected area shall resume upon written agreement of the Owner and Contractor. By Change Order, the Contract Time shall be extended appropriately and the Contract Sum shall be increased by the amount of the Contractor's reasonable additional costs of shutdown, delay, and start-up.

§ 10.3.3 To the fullest extent permitted by law, the Owner shall indemnify and hold harmless the Contractor, Subcontractors, Architect, Architect's consultants, and agents and employees of any of them from and against claims,

Init.

/

damages, losses, and expenses, including but not limited to attorneys' fees, arising out of or resulting from performance of the Work in the affected area if in fact the material or substance presents the risk of bodily injury or death as described in Section 10.3.1 and has not been rendered harmless, provided that 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), except to the extent that such damage, loss, or expense is due to the fault or negligence of the party seeking indemnity.

§ 10.3.4 The Owner shall not be responsible under this Section 10.3 for hazardous materials or substances the Contractor brings to the site unless such materials or substances are required by the Contract Documents. The Owner shall be responsible for hazardous materials or substances required by the Contract Documents, except to the extent of the Contractor's fault or negligence in the use and handling of such materials or substances.

§ 10.3.5 The Contractor shall reimburse the Owner for the cost and expense the Owner incurs (1) for remediation of hazardous materials or substances the Contractor brings to the site and negligently handles, or (2) where the Contractor fails to perform its obligations under Section 10.3.1, except to the extent that the cost and expense are due to the Owner's fault or negligence.

§ 10.3.6 If, without negligence on the part of the Contractor, the Contractor is held liable by a government agency for the cost of remediation of a hazardous material or substance solely by reason of performing Work as required by the Contract Documents, the Owner shall reimburse the Contractor for all cost and expense thereby incurred.

VERIFY WITH OWNER IF REQUIRED

§ 10.3.7 NOTICE OF ASBESTOS HAZARD

The Contractor shall be responsible for notifying and informing all personnel and tradesmen present on the job site (including those of the Subcontractors) of the presence of asbestos on this project. Areas where existing asbestos is known to still be present, has been removed or has been encapsulated or otherwise contained will be defined and denoted by the Owner's Representative. The contractor shall be responsible for procuring and installing OSHA approved signage relative to the asbestos hazard which shall remain posted during the duration of the project.

§ 10.4 Emergencies

In an emergency affecting safety of persons or property, the Contractor shall act, at the Contractor's discretion, to prevent threatened damage, injury, or loss. Additional compensation or extension of time claimed by the Contractor on account of an emergency shall be determined as provided in Article 15 and Article 7.

ARTICLE 11 INSURANCE AND BONDS

§ 11.1 Contractor's Insurance and Bonds

§ 11.1.1 The Contractor shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Contractor shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located. The Owner, Architect, and Architect's consultants shall be named as additional insureds under the Contractor's commercial general liability policy or as otherwise described in the Contract Documents.

§ 11.1.2 The Contractor shall provide surety bonds of the types, for such penal sums, and subject to such terms and conditions as required by the Contract Documents. The Contractor shall purchase and maintain the required bonds from a company or companies lawfully authorized to issue surety bonds in the jurisdiction where the Project is located.

§ 11.1.3 Upon the request of any person or entity appearing to be a potential beneficiary of bonds covering payment of obligations arising under the Contract, the Contractor shall promptly furnish a copy of the bonds or shall authorize a copy to be furnished.

§ 11.1.4 Notice of Cancellation or Expiration of Contractor's Required Insurance. Within three (3) business days of the date the Contractor becomes aware of an impending or actual cancellation or expiration of any insurance required by the Contract Documents, the Contractor shall provide notice to the Owner of such impending or actual cancellation or expiration. Upon receipt of notice from the Contractor, the Owner shall, unless the lapse in coverage arises from an act or omission of the Owner, have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by the Contractor. The furnishing of notice by the Contractor shall not relieve the Contractor of any contractual obligation to provide any required coverage.

§ 11.2 Owner's Insurance

§ 11.2.1 The Owner shall purchase and maintain insurance of the types and limits of liability, containing the endorsements, and subject to the terms and conditions, as described in the Agreement or elsewhere in the Contract Documents. The Owner shall purchase and maintain the required insurance from an insurance company or insurance companies lawfully authorized to issue insurance in the jurisdiction where the Project is located.

§ 11.2.2 Failure to Purchase Required Property Insurance. If the Owner fails to purchase and maintain the required property insurance, with all of the coverages and in the amounts described in the Agreement or elsewhere in the Contract Documents, the Owner shall inform the Contractor in writing prior to commencement of the Work. Upon receipt of notice from the Owner, the Contractor may delay commencement of the Work and may obtain insurance that will protect the interests of the Contractor, Subcontractors, and Sub-Subcontractors in the Work. When the failure to provide coverage has been cured or resolved, the Contract Sum and Contract Time shall be equitably adjusted. In the event the Owner fails to procure coverage, the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent the loss to the Owner would have been covered by the insurance to have been procured by the Owner. The cost of the insurance shall be charged to the Owner by a Change Order. If the Owner does not provide written notice, and the Contractor is damaged by the failure or neglect of the Owner to purchase or maintain the required insurance, the Owner shall reimburse the Contractor for all reasonable costs and damages attributable thereto.

§ 11.2.3 Notice of Cancellation or Expiration of Owner's Required Property Insurance. Within three (3) business days of the date the Owner becomes aware of an impending or actual cancellation or expiration of any property insurance required by the Contract Documents, the Owner shall provide notice to the Contractor of such impending or actual cancellation or expiration. Unless the lapse in coverage arises from an act or omission of the Contractor: (1) the Contractor, upon receipt of notice from the Owner, shall have the right to stop the Work until the lapse in coverage has been cured by the procurement of replacement coverage by either the Owner or the Contractor; (2) the Contract Time and Contract Sum shall be equitably adjusted; and (3) the Owner waives all rights against the Contractor, Subcontractors, and Sub-subcontractors to the extent any loss to the Owner would have been covered by the insurance had it not expired or been cancelled. If the Contractor purchases replacement coverage, the cost of the insurance shall be charged to the Owner by an appropriate Change Order. The furnishing of notice by the Owner shall not relieve the Owner of any contractual obligation to provide required insurance.

§ 11.3 Waivers of Subrogation

§ 11.3.1 The Owner and Contractor waive all rights against (1) each other and any of their subcontractors, sub-subcontractors, agents, and employees, each of the other; (2) the Architect and Architect's consultants; and (3) Separate Contractors, if any, and any of their subcontractors, sub-subcontractors, agents, and employees, for damages caused by fire, or other causes of loss, to the extent those losses are covered by property insurance required by the Agreement or other property insurance applicable to the Project, except such rights as they have to proceeds of such insurance. The Owner or Contractor, as appropriate, shall require similar written waivers in favor of the individuals and entities identified above from the Architect, Architect's consultants, Separate Contractors, subcontractors, and sub-subcontractors. The policies of insurance purchased and maintained by each person or entity agreeing to waive claims pursuant to this section 11.3.1 shall not prohibit this waiver of subrogation. This waiver of subrogation shall be effective as to a person or entity (1) even though that person or entity would otherwise have a duty of indemnification, contractual or otherwise, (2) even though that person or entity did not pay the insurance premium directly or indirectly, or (3) whether or not the person or entity had an insurable interest in the damaged property.

(Paragraph deleted)

(Paragraph deleted)

§ 11.3.2 If during the Project construction period the Owner insures properties, real or personal or both, at or adjacent to the site by property insurance under policies separate from those insuring the Project, or if after final payment

Init.

property insurance is to be provided on the completed Project through a policy or policies other than those insuring the Project during the construction period, to the extent permissible by such policies, the Owner waives all rights in accordance with the terms of Section 11.3.1 for damages caused by fire or other causes of loss covered by this separate property insurance.

§ 11.4 Loss of Use, Business Interruption, and Delay in Completion Insurance

The Owner, at the Owner's option, may purchase and maintain insurance that will protect the Owner against loss of use of the Owner's property, or the inability to conduct normal operations, due to fire or other causes of loss. The Owner waives all rights of action against the Contractor and Architect for loss of use of the Owner's property, due to fire or other hazards however caused.

§ 11.5 Adjustment and Settlement of Insured Loss

§ 11.5.1 A loss insured under the property insurance required by the Agreement shall be adjusted by the Owner as fiduciary and made payable to the Owner as fiduciary for the insureds, as their interests may appear, subject to requirements of any applicable mortgagee clause and of Section 11.5.2. The Owner shall pay the Architect and Contractor their just shares of insurance proceeds received by the Owner, and by appropriate agreements the Architect and Contractor shall make payments to their consultants and Subcontractors in similar manner.

§ 11.5.2 Prior to settlement of an insured loss, the Owner shall notify the Contractor of the terms of the proposed settlement as well as the proposed allocation of the insurance proceeds. The Contractor shall have 14 days from receipt of notice to object to the proposed settlement or allocation of the proceeds. If the Contractor does not object, the Owner shall settle the loss and the Contractor shall be bound by the settlement and allocation. Upon receipt, the Owner shall deposit the insurance proceeds in a separate account and make the appropriate distributions. Thereafter, if no other agreement is made or the Owner does not terminate the Contract for convenience, the Owner and Contractor shall execute a Change Order for reconstruction of the damaged or destroyed Work in the amount allocated for that purpose. If the Contractor timely objects to either the terms of the proposed settlement or the allocation of the proceeds, the Owner may proceed to settle the insured loss, and any dispute between the Owner and Contractor arising out of the settlement or allocation of the proceeds shall be resolved pursuant to Article 15. Pending resolution of any dispute, the Owner may issue a Construction Change Directive for the reconstruction of the damaged or destroyed Work.

ARTICLE 12 UNCOVERING AND CORRECTION OF WORK

§ 12.1 Uncovering of Work

§ 12.1.1 If a portion of the Work is covered contrary to the Architect's request or to requirements specifically expressed in the Contract Documents, it must, if requested in writing by the Architect, be uncovered for the Architect's examination and be replaced at the Contractor's expense without change in the Contract Time.

§ 12.1.2 If a portion of the Work has been covered that the Architect has not specifically requested to examine prior to its being covered, the Architect may request to see such Work and it shall be uncovered by the Contractor. If such Work is in accordance with the Contract Documents, the Contractor shall be entitled to an equitable adjustment to the Contract Sum and Contract Time as may be appropriate. If such Work is not in accordance with the Contract Documents, the costs of uncovering the Work, and the cost of correction, shall be at the Contractor's expense.

§ 12.2 Correction of Work

§ 12.2.1 Before Substantial Completion

The Contractor shall promptly correct Work rejected by the Architect or failing to conform to the requirements of the Contract Documents, discovered before Substantial Completion and whether or not fabricated, installed or completed. Costs of correcting such rejected Work, including additional testing and inspections, the cost of uncovering and replacement, and compensation for the Architect's services and expenses made necessary thereby, shall be at the Contractor's expense.

§ 12.2.2 After Substantial Completion

§ 12.2.2.1 In addition to the Contractor's obligations under Section 3.5, if, within one year after the date of Substantial Completion of the Work or designated portion thereof or after the date for commencement of warranties established under Section 9.9.1, or by terms of any applicable special warranty required by the Contract Documents, any of the Work is found to be not in accordance with the requirements of the Contract Documents, the Contractor shall correct it promptly after receipt of notice from the Owner to do so, unless the Owner has previously given the Contractor a

Init.

written acceptance of such condition. The Owner shall give such notice promptly after discovery of the condition. During the one-year period for correction of Work, if the Owner fails to notify the Contractor and give the Contractor an opportunity to make the correction, the Owner waives the rights to require correction by the Contractor and to make a claim for breach of warranty. If the Contractor fails to correct nonconforming Work within a reasonable time during that period after receipt of notice from the Owner or Architect, the Owner may correct it in accordance with Section 2.5.

§ 12.2.2 The one-year period for correction of Work shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual completion of that portion of the Work.

§ 12.2.3 The one-year period for correction of Work shall not be extended by corrective Work performed by the Contractor pursuant to this Section 12.2.

§ 12.2.3 The Contractor shall remove from the site portions of the Work that are not in accordance with the requirements of the Contract Documents and are neither corrected by the Contractor nor accepted by the Owner.

§ 12.2.4 The Contractor shall bear the cost of correcting destroyed or damaged construction of the Owner or Separate Contractors, whether completed or partially completed, caused by the Contractor's correction or removal of Work that is not in accordance with the requirements of the Contract Documents.

§ 12.2.5 Nothing contained in this Section 12.2 shall be construed to establish a period of limitation with respect to other obligations the Contractor has under the Contract Documents. Establishment of the one-year period for correction of Work as described in Section 12.2.2 relates only to the specific obligation of the Contractor to correct the Work, and has no relationship to the time within which the obligation to comply with the Contract Documents may be sought to be enforced, nor to the time within which proceedings may be commenced to establish the Contractor's liability with respect to the Contractor's obligations other than specifically to correct the Work.

§ 12.3 Acceptance of Nonconforming Work

If the Owner prefers to accept Work that is not in accordance with the requirements of the Contract Documents, the Owner may do so instead of requiring its removal and correction, in which case the Contract Sum will be reduced as appropriate and equitable. Such adjustment shall be effected whether or not final payment has been made.

ARTICLE 13 MISCELLANEOUS PROVISIONS

§ 13.1 Governing Law

The Contract shall be governed by the law of the place where the Project is located, excluding that jurisdiction's choice of law rules. If the parties have selected arbitration as the method of binding dispute resolution, the Federal Arbitration Act shall govern Section 15.4.

§ 13.2 Successors and Assigns

§ 13.2.1 The Owner and Contractor respectively bind themselves, their partners, successors, assigns, and legal representatives to covenants, agreements, and obligations contained in the Contract Documents. Except as provided in Section 13.2.2, neither party to the Contract shall assign the Contract as a whole without written consent of the other. If either party attempts to make an assignment without such consent, that party shall nevertheless remain legally responsible for all obligations under the Contract.

§ 13.2.2 The Owner may, without consent of the Contractor, assign the Contract to a lender providing construction financing for the Project, if the lender assumes the Owner's rights and obligations under the Contract Documents. The Contractor shall execute all consents reasonably required to facilitate the assignment.

§ 13.3 Rights and Remedies

§ 13.3.1 Duties and obligations imposed by the Contract Documents and rights and remedies available thereunder shall be in addition to and not a limitation of duties, obligations, rights, and remedies otherwise imposed or available by law.

§ 13.3.2 No action or failure to act by the Owner, Architect, or Contractor shall constitute a waiver of a right or duty afforded them under the Contract, nor shall such action or failure to act constitute approval of or acquiescence in a breach thereunder, except as may be specifically agreed upon in writing.

§ 13.4 Tests and Inspections

§ 13.4.1 Tests, inspections, and approvals of portions of the Work shall be made as required by the Contract Documents and by applicable laws, statutes, ordinances, codes, rules, and regulations or lawful orders of public authorities. Unless otherwise provided, the Contractor shall make arrangements for such tests, inspections, and approvals with an independent testing laboratory or entity acceptable to the Owner, or with the appropriate public authority, and shall bear all related costs of tests, inspections, and approvals. The Contractor shall give the Architect timely notice of when and where tests and inspections are to be made so that the Architect may be present for such procedures. The Owner shall bear costs of tests, inspections, or approvals that do not become requirements until after bids are received or negotiations concluded. The Owner shall directly arrange and pay for tests, inspections, or approvals where building codes or applicable laws or regulations so require.

§ 13.4.2 If the Architect, Owner, or public authorities having jurisdiction determine that portions of the Work require additional testing, inspection, or approval not included under Section 13.4.1, the Architect will, upon written authorization from the Owner, instruct the Contractor to make arrangements for such additional testing, inspection, or approval, by an entity acceptable to the Owner, and the Contractor shall give timely notice to the Architect of when and where tests and inspections are to be made so that the Architect may be present for such procedures. Such costs, except as provided in Section 13.4.3, shall be at the Owner's expense.

§ 13.4.3 If procedures for testing, inspection, or approval under Sections 13.4.1 and 13.4.2 reveal failure of the portions of the Work to comply with requirements established by the Contract Documents, all costs made necessary by such failure, including those of repeated procedures and compensation for the Architect's services and expenses, shall be at the Contractor's expense.

§ 13.4.4 Required certificates of testing, inspection, or approval shall, unless otherwise required by the Contract Documents, be secured by the Contractor and promptly delivered to the Architect.

§ 13.4.5 If the Architect is to observe tests, inspections, or approvals required by the Contract Documents, the Architect will do so promptly and, where practicable, at the normal place of testing.

§ 13.4.6 Tests or inspections conducted pursuant to the Contract Documents shall be made promptly to avoid unreasonable delay in the Work.

§ 13.5 Interest

Payments due and unpaid under the Contract Documents shall bear interest from the date payment is due at the rate the parties agree upon in writing or, in the absence thereof, at the legal rate prevailing from time to time at the place where the Project is located.

§ 13.6 ADVERTISING

The Contractor shall not place or allow its Subcontractors or Sub-subcontractors to place any advertising on the site without the Owner's prior written consent, which the Owner may withhold for any or no reason. Except as necessary to fulfill obligations under the contract Documents, the Contractor and its Subcontractors and Sub-subcontractors shall not advertise or publicize their engagement pursuant to the Contract or a subcontract or with respect to the Project except as the Owner may from time to time specifically authorize in writing subject to such limitations and requirements as the Owner may in its discretion impose with respect to the means or content of any such advertising or publicity.

§ 13.7 SKILLED LABOR

All labor shall be performed by skilled workers in a thorough, workmanlike manner, in conformity with the Contract Documents and established practices of the trade.

§ 13.8 MANUFACTURED PRODUCTS

The Contractor shall apply, install, connect, erect, use, clean, and condition all manufactured articles, materials, and equipment as directed in the manufacturer's latest printed instructions. The Contractor shall

not use any manufactured articles, materials, or equipment for any purpose not recommended by the manufacturer. The Contractor shall bring to the Architect's attention any discrepancies between a specified use or procedure and the manufacturer's recommendations prior to installation.

ARTICLE 14 TERMINATION OR SUSPENSION OF THE CONTRACT

§ 14.1 Termination by the Contractor

§ 14.1.1 The Contractor may terminate the Contract if the Work is stopped for a period of 30 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, for any of the following reasons:

- .1** Issuance of an order of a court or other public authority having jurisdiction that requires all Work to be stopped;
- .2** An act of government, such as a declaration of national emergency, that requires all Work to be stopped;
- .3** Because the Architect has not issued a Certificate for Payment and has not notified the Contractor of the reason for withholding certification as provided in Section 9.4.1, or because the Owner has not made payment on a Certificate for Payment within the time stated in the Contract Documents; or
- .4** The Owner has failed to furnish to the Contractor reasonable evidence as required by Section 2.2.

§ 14.1.2 The Contractor may terminate the Contract if, through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, their agents or employees, or any other persons or entities performing portions of the Work, repeated suspensions, delays, or interruptions of the entire Work by the Owner as described in Section 14.3, constitute in the aggregate more than 100 percent of the total number of days scheduled for completion, or 120 days in any 365-day period, whichever is less.

§ 14.1.3 If one of the reasons described in Section 14.1.1 or 14.1.2 exists, the Contractor may, upon seven days' notice to the Owner and Architect, terminate the Contract and recover from the Owner payment for Work executed, as well as reasonable overhead and profit on Work not executed, and costs incurred by reason of such termination.

§ 14.1.4 If the Work is stopped for a period of 60 consecutive days through no act or fault of the Contractor, a Subcontractor, a Sub-subcontractor, or their agents or employees or any other persons or entities performing portions of the Work because the Owner has repeatedly failed to fulfill the Owner's obligations under the Contract Documents with respect to matters important to the progress of the Work, the Contractor may, upon seven additional days' notice to the Owner and the Architect, terminate the Contract and recover from the Owner as provided in Section 14.1.3.

§ 14.2 Termination by the Owner for Cause

§ 14.2.1 The Owner may terminate the Contract if the Contractor

- .1** repeatedly refuses or fails to supply enough properly skilled workers or proper materials;
- .2** fails to make payment to Subcontractors or suppliers in accordance with the respective agreements between the Contractor and the Subcontractors or suppliers;
- .3** repeatedly disregards applicable laws, statutes, ordinances, codes, rules and regulations, or lawful orders of a public authority; or
- .4** otherwise is guilty of substantial breach of a provision of the Contract Documents.

§ 14.2.2 When any of the reasons described in Section 14.2.1 exist, and upon certification by the Architect that sufficient cause exists to justify such action, the Owner may, without prejudice to any other rights or remedies of the Owner and after giving the Contractor and the Contractor's surety, if any, seven days' notice, terminate employment of the Contractor and may, subject to any prior rights of the surety:

- .1** Exclude the Contractor from the site and take possession of all materials, equipment, tools, and construction equipment and machinery thereon owned by the Contractor;
- .2** Accept assignment of subcontracts pursuant to Section 5.4; and
- .3** Finish the Work by whatever reasonable method the Owner may deem expedient. Upon written request of the Contractor, the Owner shall furnish to the Contractor a detailed accounting of the costs incurred by the Owner in finishing the Work.

§ 14.2.3 When the Owner terminates the Contract for one of the reasons stated in Section 14.2.1, the Contractor shall not be entitled to receive further payment until the Work is finished.

§ 14.2.4 If the unpaid balance of the Contract Sum exceeds costs of finishing the Work, including compensation for the Architect's services and expenses made necessary thereby, and other damages incurred by the Owner and not expressly waived, such excess shall be paid to the Contractor. If such costs and damages exceed the unpaid balance, the Contractor shall pay the difference to the Owner. The amount to be paid to the Contractor or Owner, as the case may be, shall be certified by the Initial Decision Maker, upon application, and this obligation for payment shall survive termination of the Contract.

§ 14.3 Suspension by the Owner for Convenience

§ 14.3.1 The Owner may, without cause, order the Contractor in writing to suspend, delay or interrupt the Work, in whole or in part for such period of time as the Owner may determine.

§ 14.3.2 The Contract Sum and Contract Time shall be adjusted for increases in the cost and time caused by suspension, delay, or interruption under Section 14.3.1. Adjustment of the Contract Sum shall include profit. No adjustment shall be made to the extent

- .1 that performance is, was, or would have been, so suspended, delayed, or interrupted, by another cause for which the Contractor is responsible; or
- .2 that an equitable adjustment is made or denied under another provision of the Contract.

§ 14.4 Termination by the Owner for Convenience

§ 14.4.1 The Owner may, at any time, terminate the Contract for the Owner's convenience and without cause.

§ 14.4.2 Upon receipt of notice from the Owner of such termination for the Owner's convenience, the Contractor shall

- .1 cease operations as directed by the Owner in the notice;
- .2 take actions necessary, or that the Owner may direct, for the protection and preservation of the Work; and
- .3 except for Work directed to be performed prior to the effective date of termination stated in the notice, terminate all existing subcontracts and purchase orders and enter into no further subcontracts and purchase orders.

§ 14.4.3 In case of such termination for the Owner's convenience, the Owner shall pay the Contractor for Work properly executed; costs incurred by reason of the termination, including costs attributable to termination of Subcontracts; and the termination fee, if any, set forth in the Agreement.

ARTICLE 15 CLAIMS AND DISPUTES

§ 15.1 Claims

§ 15.1.1 Definition

A Claim is a demand or assertion by one of the parties seeking, as a matter of right, payment of money, a change in the Contract Time, or other relief with respect to the terms of the Contract. The term "Claim" also includes other disputes and matters in question between the Owner and Contractor arising out of or relating to the Contract. The responsibility to substantiate Claims shall rest with the party making the Claim. This Section 15.1.1 does not require the Owner to file a Claim in order to impose liquidated damages in accordance with the Contract Documents.

§ 15.1.2 Time Limits on Claims

The Owner and Contractor shall commence all Claims and causes of action against the other and arising out of or related to the Contract, whether in contract, tort, breach of warranty or otherwise, in accordance with the requirements of the binding dispute resolution method selected in the Agreement and within the period specified by applicable law, but in any case not more than 10 years after the date of Substantial Completion of the Work. The Owner and Contractor waive all Claims and causes of action not commenced in accordance with this Section 15.1.2.

§ 15.1.3 Notice of Claims

§ 15.1.3.1 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered prior to expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party and to the Initial Decision Maker with a copy sent to the Architect, if the Architect is not serving as the Initial Decision Maker. Claims by either party under this Section 15.1.3.1 shall be initiated within 21 days after occurrence of the event giving rise to such Claim or within 21 days after the claimant first recognizes the condition giving rise to the Claim, whichever is later.

§ 15.1.3.2 Claims by either the Owner or Contractor, where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2, shall be initiated by notice to the other party. In such event, no decision by the Initial Decision Maker is required.

§ 15.1.4 Continuing Contract Performance

§ 15.1.4.1 Pending final resolution of a Claim, except as otherwise agreed in writing or as provided in Section 9.7 and Article 14, the Contractor shall proceed diligently with performance of the Contract and the Owner shall continue to make payments in accordance with the Contract Documents.

§ 15.1.4.2 The Contract Sum and Contract Time shall be adjusted in accordance with the Initial Decision Maker's decision, subject to the right of either party to proceed in accordance with this Article 15. The Architect will issue Certificates for Payment in accordance with the decision of the Initial Decision Maker.

§ 15.1.5 Claims for Additional Cost

If the Contractor wishes to make a Claim for an increase in the Contract Sum, notice as provided in Section 15.1.3 shall be given before proceeding to execute the portion of the Work that is the subject of the Claim. Prior notice is not required for Claims relating to an emergency endangering life or property arising under Section 10.4.

§ 15.1.6 Claims for Additional Time

§ 15.1.6.1 If the Contractor wishes to make a Claim for an increase in the Contract Time, notice as provided in Section 15.1.3 shall be given. The Contractor's Claim shall include an estimate of cost and of probable effect of delay on progress of the Work. In the case of a continuing delay, only one Claim is necessary.

§ 15.1.6.2 If adverse weather conditions are the basis for a Claim for additional time, such Claim shall be documented by data substantiating that weather conditions were abnormal for the period of time, could not have been reasonably anticipated, and had an adverse effect on the scheduled construction.

§ 15.1.6.3 Claims for increase in the Contract Time shall be made promptly after occurrence of the condition purported to justify the increase. Failure to provide written notice of a request for an increase in the Contract Time within 10 days after the occurrence of the condition shall constitute a waiver of the right to request an increase. Claims for increase in the contract time shall set forth in detail the circumstances that form the basis for the Claim, the date upon which each cause of delay began to affect the progress of the Work, the date upon which each cause of delay ceased to affect the progress of the Work and the number of days' increase in the Contract Time Claimed as a consequence of each such cause of delay and the amount of any proposed adjustment to the Contract Price. The Contractor shall provide such supporting documentation as the Owner may require including, where appropriate, a revised construction schedule indicating all the activities affected by the circumstances forming the basis of the Claim.

§ 15.1.6.4 The Contractor shall not be entitled to a separate increase in the Contract Time for each of the number of causes of delay which may have concurrent or interrelated effects on the progress of the Work, or for concurrent delays due to the fault of the Contractor.

§ 15.1.7 Waiver of Claims for Consequential Damages

The Contractor and Owner waive Claims against each other for consequential damages arising out of or relating to this Contract. This mutual waiver includes

- .1 damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons; and
- .2 damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit, except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article 14. Nothing contained in this Section 15.1.7 shall be deemed to preclude assessment of liquidated damages, when applicable, in accordance with the requirements of the Contract Documents.

§ 15.2 Initial Decision

§ 15.2.1 Claims, excluding those where the condition giving rise to the Claim is first discovered after expiration of the period for correction of the Work set forth in Section 12.2.2 or arising under Sections 10.3, 10.4, and 11.5, shall be referred to the Initial Decision Maker for initial decision. The Architect will serve as the Initial Decision Maker, unless otherwise indicated in the Agreement. Except for those Claims excluded by this Section 15.2.1, an initial decision shall be required as a condition precedent to mediation of any Claim. If an initial decision has not been rendered within 30 days after the Claim has been referred to the Initial Decision Maker, the party asserting the Claim may demand mediation and binding dispute resolution without a decision having been rendered. Unless the Initial Decision Maker and all affected parties agree, the Initial Decision Maker will not decide disputes between the Contractor and persons or entities other than the Owner.

§ 15.2.2 The Initial Decision Maker will review Claims and within ten days of the receipt of a Claim take one or more of the following actions: (1) request additional supporting data from the claimant or a response with supporting data from the other party, (2) reject the Claim in whole or in part, (3) approve the Claim, (4) suggest a compromise, or (5) advise the parties that the Initial Decision Maker is unable to resolve the Claim if the Initial Decision Maker lacks sufficient information to evaluate the merits of the Claim or if the Initial Decision Maker concludes that, in the Initial Decision Maker's sole discretion, it would be inappropriate for the Initial Decision Maker to resolve the Claim.

§ 15.2.3 In evaluating Claims, the Initial Decision Maker may, but shall not be obligated to, consult with or seek information from either party or from persons with special knowledge or expertise who may assist the Initial Decision Maker in rendering a decision. The Initial Decision Maker may request the Owner to authorize retention of such persons at the Owner's expense.

§ 15.2.4 If the Initial Decision Maker requests a party to provide a response to a Claim or to furnish additional supporting data, such party shall respond, within ten days after receipt of the request, and shall either (1) provide a response on the requested supporting data, (2) advise the Initial Decision Maker when the response or supporting data will be furnished, or (3) advise the Initial Decision Maker that no supporting data will be furnished. Upon receipt of

the response or supporting data, if any, the Initial Decision Maker will either reject or approve the Claim in whole or in part.

§ 15.2.5 The Initial Decision Maker will render an initial decision approving or rejecting the Claim, or indicating that the Initial Decision Maker is unable to resolve the Claim. This initial decision shall (1) be in writing; (2) state the reasons therefor; and (3) notify the parties and the Architect, if the Architect is not serving as the Initial Decision Maker, of any change in the Contract Sum or Contract Time or both. The initial decision shall be final and binding on the parties but subject to mediation and, if the parties fail to resolve their dispute through mediation, to binding dispute resolution.

§ 15.2.6 Either party may file for mediation of an initial decision at any time, subject to the terms of Section 15.2.6.1.

§ 15.2.6.1 Either party may, within 30 days from the date of receipt of an initial decision, demand in writing that the other party file for mediation. If such a demand is made and the party receiving the demand fails to file for mediation within 30 days after receipt thereof, then both parties waive their rights to mediate or pursue binding dispute resolution proceedings with respect to the initial decision.

§ 15.2.7 In the event of a Claim against the Contractor, the Owner may, but is not obligated to, notify the surety, if any, of the nature and amount of the Claim. If the Claim relates to a possibility of a Contractor's default, the Owner may, but is not obligated to, notify the surety and request the surety's assistance in resolving the controversy.

§ 15.2.8 If a Claim relates to or is the subject of a mechanic's lien, the party asserting such Claim may proceed in accordance with applicable law to comply with the lien notice or filing deadlines.

§ 15.3 Mediation

§ 15.3.1 Claims, disputes, or other matters in controversy arising out of or related to the Contract, except those waived as provided for in Sections 9.10.4, 9.10.5, and 15.1.7, shall be subject to mediation as a condition precedent to binding dispute resolution.

§ 15.3.2 The parties shall endeavor to resolve their Claims by mediation which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. A request for mediation shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the mediation. The request may be made concurrently with the filing of binding dispute resolution proceedings but, in such event, mediation shall proceed in advance of binding dispute resolution proceedings, which shall be stayed pending mediation for a period of 60 days from the date of filing, unless stayed for a longer period by agreement of the parties or court order. If an arbitration is stayed pursuant to this Section 15.3.2, the parties may nonetheless proceed to the selection of the arbitrator(s) and agree upon a schedule for later proceedings.

§ 15.3.3 Either party may, within 30 days from the date that mediation has been concluded without resolution of the dispute or 60 days after mediation has been demanded without resolution of the dispute, demand in writing that the other party file for binding dispute resolution. If such a demand is made and the party receiving the demand fails to file for binding dispute resolution within 60 days after receipt thereof, then both parties waive their rights to binding dispute resolution proceedings with respect to the initial decision.

§ 15.3.4 The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in the place where the Project is located, unless another location is mutually agreed upon. Agreements reached in mediation shall be enforceable as settlement agreements in any court having jurisdiction thereof.

§ 15.4 Arbitration

§ 15.4.1 If the parties have selected arbitration as the method for binding dispute resolution in the Agreement, any Claim subject to, but not resolved by, mediation shall be subject to arbitration which, unless the parties mutually agree otherwise, shall be administered by the American Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement. The Arbitration shall be conducted in the place where the Project is located, unless another location is mutually agreed upon. A demand for arbitration shall be made in writing, delivered to the other party to the Contract, and filed with the person or entity administering the arbitration. The party

filing a notice of demand for arbitration must assert in the demand all Claims then known to that party on which arbitration is permitted to be demanded.

§ 15.4.1.1 A demand for arbitration shall be made no earlier than concurrently with the filing of a request for mediation, but in no event shall it be made after the date when the institution of legal or equitable proceedings based on the Claim would be barred by the applicable statute of limitations. For statute of limitations purposes, receipt of a written demand for arbitration by the person or entity administering the arbitration shall constitute the institution of legal or equitable proceedings based on the Claim.

§ 15.4.2 The award rendered by the arbitrator or arbitrators shall be final, and judgment may be entered upon it in accordance with applicable law in any court having jurisdiction thereof.

§ 15.4.3 The foregoing agreement to arbitrate and other agreements to arbitrate with an additional person or entity duly consented to by parties to the Agreement, shall be specifically enforceable under applicable law in any court having jurisdiction thereof.

§ 15.4.4 Consolidation or Joinder

§ 15.4.4.1 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may consolidate an arbitration conducted under this Agreement with any other arbitration to which it is a party provided that (1) the arbitration agreement governing the other arbitration permits consolidation, (2) the arbitrations to be consolidated substantially involve common questions of law or fact, and (3) the arbitrations employ materially similar procedural rules and methods for selecting arbitrator(s).

§ 15.4.4.2 Subject to the rules of the American Arbitration Association or other applicable arbitration rules, either party may include by joinder persons or entities substantially involved in a common question of law or fact whose presence is required if complete relief is to be accorded in arbitration, provided that the party sought to be joined consents in writing to such joinder. Consent to arbitration involving an additional person or entity shall not constitute consent to arbitration of any claim, dispute or other matter in question not described in the written consent.

§ 15.4.4.3 The Owner and Contractor grant to any person or entity made a party to an arbitration conducted under this Section 15.4, whether by joinder or consolidation, the same rights of joinder and consolidation as those of the Owner and Contractor under this Agreement.

Steubenville City School District

SECTION 007310

SPECIAL CONDITIONS

1. The Subcontractor's work shall commence, be performed, and be substantially completed in accordance with the schedule set forth by the bid documents. Subcontractor shall cooperate with Construction manager in scheduling and performing the Subcontract Work to avoid conflict, delay in or interference with the Subcontract Work of Construction manager, other subcontractors or Owner's own forces.
2. Anything mentioned in the specifications and not shown on the drawings or shown on the drawings and not mentioned in the specifications, shall be of like effect as if shown and mentioned on both.
3. Construction manager and Subcontractor shall be mutually bound by the terms of the Subcontract Documents and, to the extent that provisions of the Prime Contract apply to the Subcontract Work (as hereinafter defined) of Subcontractor, Construction manager shall assume toward Subcontractor all obligations and responsibilities that the Owner assumes with Construction manager under the Prime Contract, and Subcontractor shall assume all obligations and responsibilities which Construction manager assumes with the Owner and the Architect under the Prime Contract. Construction manager shall have the benefit of all rights, remedies, and redress against Subcontractor which the Owner has against Construction manager under the Prime Contract, insofar as applicable to this Agreement. In the conduct of work hereunder, Subcontractor is an independent contractor, not an agent or employee of Construction manager. Where a provision of the Prime Contract is inconsistent with a provision of this Agreement, this Agreement shall govern.
4. Subcontractor shall enter into agreements with its Sub-subcontractors performing portions of the Subcontract Work of this Agreement to which Subcontractor and the Sub-subcontractor are mutually bound, for the Subcontract Work to be performed by the Sub-subcontractor, assuming toward each other all obligations and responsibilities which Construction manager and Subcontractor assume toward each other and having the benefit of all rights, remedies, and redress each against the other which Construction manager and Subcontractor have by virtue of the provisions of this Agreement. For all purposes herein "sub subcontractor" shall be deemed to include all tier sub-subcontractors.
5. Neither Subcontractor nor any sub-subcontractor shall have any right to demand claims of any dispute which arises out of this Agreement or the performance or nonperformance of the obligations of Construction manager, Subcontractor or any sub-subcontractor. Notwithstanding the provision set forth above, Subcontractor and any sub-subcontractor shall be obliged to submit to claims demanded by Owner or Construction manager in accordance with AIA Document A133, Article 12, Section 1.1. Furthermore, with respect to any issues involving said Subcontractor or sub-subcontractor in said claims and, said Subcontractor and sub-subcontractor agree to be bound thereby as set forth in Article 15 of AIA Document A201.
6. Subcontractor shall promptly submit shop drawings, product data, samples, and similar submittals required by the Subcontract Documents with reasonable promptness and in such sequence as to cause no delay in the Subcontract Work or in the activities of Construction manager or other subcontractors. Upon the request of Construction manager, Subcontractor shall furnish Construction manager with copies of all orders issued to Vendors for materials, and these copies of orders must show shipping points, shipping dates and quantities. Orders shall be sent to Construction manager as soon as they are placed with the Vendors.

7. Subcontractor represents that it has had an opportunity to examine and has carefully examined, or if it has not examined, waives such examination at its own risk, the Site, its surroundings, the local conditions, and all drawings and specifications for the Subcontract Work to be done by Subcontractor that it has made all investigations essential to a full understanding of the difficulties which may be encountered, that the drawings and specifications are adequate for its performance of the Subcontract Work under the local conditions and surroundings of the Site and any difficulties said conditions and surroundings may present, and that it has special qualifications for performing the Subcontract Work in accordance with such drawings and specifications and other terms of this contract within the time specified.
8. The Subcontractor shall furnish to Construction manager periodic progress reports on the Subcontract Work of this Subcontract as mutually agreed, including information on the status of materials and equipment which may be during preparation or manufacture. During the progress of the Subcontract Work, Subcontractor shall keep at its site office, in good and legible form, a record of all work done different from or in addition to that shown on Construction manager's drawings or previously approved drawings. Such changes shall clearly and accurately show the "as built" conditions and dimensions. Subcontractor shall deliver copies of such drawings to Construction manager as requested.
9. Construction manager, and its representatives, and the Owner, shall at all reasonable times have access to the Subcontract Work in preparation or progress for purposes of expediting, inspection and testing. Subcontractor shall provide sufficient, safe, and proper facilities for such inspection and testing. For any Work that is being executed away from the site, Construction manager and/or Owner shall have the right, upon request, at any time, to inspect or witness tests before delivery to the Site or before such Work is covered. Failure to discover or reject any Defective Work shall not relieve Subcontractor from responsibility for the Subcontract Work, and Subcontractor shall have no right to rely on the inspections conducted by Construction manager or Owner.
10. Subcontractor agrees that the Architect and Construction manager will have the authority to reject Work which does not conform to the Prime Contract. The Architect's decisions on matters relating to aesthetic effect shall be final if consistent with the intent expressed in the Prime Contract.
11. Subcontractor shall pay for materials, equipment, and labor used in connection with the performance of the Subcontract through the period covered by previous payments received from Construction manager, and shall furnish a Subcontractor affidavit setting forth all sub-subcontractors and materialmen with whom it has contracted, amounts of contracts, amounts paid to date, amounts being requested and balance due along with Waivers of Lien in accordance with Ohio's Mechanics Lien Law from the sub-subcontractors and materialmen for the total amount of the previous application for payment. Subcontractors shall pay, or cause to be paid, each sub-subcontractor and/or materialmen within ten (10) days of receipt of payment in full compliance with Ohio Revised Code § 4113.61, the Ohio Prompt Payment Act, an amount equal to that amount which is due and owing said sub-subcontractor and/or materialmen.
12. Subcontractor shall take necessary precautions to properly protect the Subcontract Work of other subcontractors from damage caused by operations under the Subcontract. Furthermore, as Subcontractor removes, alters, destroys, or defaces the property of Construction manager or Owner, or the work of another contractor in the performance of the Subcontract Work, Subcontractor shall promptly repair or replace the affected property or work to the satisfaction of Construction manager and/or Owner.
13. Subcontractor shall cooperate with Construction manager, other subcontractors, and the Owner's own forces whose work might interfere with the Subcontract Work. Subcontractor shall participate in the preparation of coordinated drawings in areas of congestions, if required by the Prime Contract, specifically noting and advising Construction manager of potential conflicts between the Subcontract Work of Subcontractor and that of Construction manager, other subcontractors, or the Owner's own forces.

14. Subcontractor shall always proceed diligently with the performance of the Subcontract Work in accordance with the Subcontract Documents and the approved progress schedule. Performance shall continue during the pendency of any dispute arising under or in any way relating to the Subcontract, unless Construction manager exercises its right to terminate this Subcontract as herein provided. The pendency of any dispute shall not relieve Subcontractor of the duty to diligently proceed with the performance of the Subcontract Work unless Construction manager shall have terminated Subcontractor's right to proceed.
15. Liquidated damages for delay, if assessed by the Owner, shall be assessed against Subcontractor to the extent caused by Subcontractor, Subcontractor's employees and agents, sub-subcontractors, suppliers or any person or entity for whose acts Subcontractor may be liable, and in no case for delays or causes arising outside the scope of this Subcontract.
16. If Construction manager and/or the Architect determines that Subcontractor has improperly performed the Subcontract Work or failed to perform the Subcontract Work in accordance with the Subcontract Documents or the Subcontract Work is rejected by the Construction manager and/or the Architect and Subcontractor fails within forty-eight (48) hours after receipt of written notice from Construction manager to commence and continue correction thereof with diligence and promptness acceptable to Construction manager in its sole discretion, Construction manager, in addition to and not in lieu of any other remedies to which Construction manager may be entitled at law or in equity, may make good such deficiencies and may deduct the cost thereof from the payments then or thereafter due Subcontractor. Such deductions by Construction manager shall not constitute an election of remedies or waiver of any other remedy to which Construction manager is entitled.
17. Construction manager shall have the right, upon notice to Subcontractor, to demand that Subcontractor's superintendent or other key personnel retained by Subcontractor, be replaced by Subcontractor. In the event of such demand, Subcontractor shall, within seven (7) days after notification thereof, replace said individual with an individual satisfactory to Construction manager, in Construction manager's sole discretion. If said replacement is disapproved, the Subcontract, at Construction manager's option, may be terminated.
18. Subcontractor shall give notices and comply with laws, ordinances, rules, regulations, and orders of public authorities bearing on performance of the Subcontract Work of this Subcontract. Subcontractor shall secure and pay for permits and governmental fees, licenses, and inspections necessary for proper execution and completion of the Subcontract Work, the furnishing of which is required by Construction manager.
19. Subcontractor hereby warrants and represents that all portions of the Subcontract Work of this Subcontract shall in all instances comply with Federal, State and Local laws and ordinances including but not limited to all applicable building codes, including, without limitation, Environmental Laws.
20. Subcontractor shall be required to develop, implement, and ensure compliance by its employees, agents and representatives with a safety program relating to the Subcontract Work, which safety program shall (a) comply with applicable Federal, State, Municipal and Local laws, ordinances, rules, regulations, and orders of public authorities for the safety of persons or property, including, without limitation, OSHA Hazard Communication Standard 1926.59 (including relevant Material Safety Data Sheets (MSDS) requirements) and Environmental Laws regarding Hazardous Materials, (b) comply with and reflect generally accepted industry standards for safety; and (c) comply with any site-specific safety programs/plans developed by Construction manager. Any safety programs developed by Subcontractor shall be subject to coordination by Construction manager with the safety programs of any other subcontractors of Construction manager; provided, however, that the parties hereby acknowledge that Construction manager shall have no responsibility or liability for the development, approval, or implementation and enforcement of Subcontractor's safety program. Subcontractor shall report an

injury to an employee or agent of Subcontractor which occurred at the site to Construction manager immediately. Subcontractor agrees to indemnify, protect, defend, release and save Construction manager and the Owner, and their respective officers, agents, employees, servants, and/or subcontractors harmless from and against any and all actions, lawsuits, claims, costs, expenses, fees, including reasonable attorney fees, loss, damage, or liability of any kind or nature, when such liability results from or is on account of any safety program or the failure of Subcontractor or any of its officers, agents, employees, servants and/or sub-subcontractors to develop, implement or comply with any safety program, regardless of whether the safety program was received or reviewed by Construction manager.

21. Subcontractor shall notify Construction manager of any failure ("Safety Violation") by Subcontractor, any of its subcontractors, or any of their respective employees, agents, or representatives to comply with the safety obligations of Subcontractor set forth in the contract document and these special conditions, which notice shall be provided immediately of occurrence of the Safety Violation. Subcontractor shall, immediately report the occurrence of any Safety Violation, take corrective action to (a) cure the Safety Violation, including, without limitation, taking any action required by law, rule, regulation, or safety program/plan governing the Subcontract Work or Project, and (b) ensure that there is no recurrence of such Safety Violation, including, without limitation, removing any employees, supervisors, or other individuals responsible for the Safety Violation and/or providing training to any such individuals with respect to the Safety Violation. Any such corrective action shall be subject to Construction manager's prior written approval, which approval shall be in Construction manager's sole discretion. Provide a site-specific plan prior to any work commencing. To work in a safe manner at all times and comply with all safety rules, procedures and requirements. To immediately report all accidents, near misses and unsafe conditions, no matter the severity. Provide an SDS for ALL chemicals brought on site. Attend weekly safety meetings. Perform and/ or participate in daily STA meetings. Abide by all Grae-Con policies and procedures as a minimum.

- Immediately stop all work in the area & Contact Site Superintendent
- Site Superintendent will determine the severity of the accident.
- Account for all personnel.
- Immediately determine if there is an injury or illness
- Secure the area, hold equipment/ property for inspection & take photos.
- Superintendents will immediately report the accident to the Corporate Office by phone at (740) 282-6830 (Randy, Dan and/ or Rob).
- Call the emergency squad or arrange for medical transportation and evaluation if needed. If in Doubt call the emergency squad. (Drug & Alcohol test to be administered at medical facility)
- Information needed and available at time of call to office (use Incident Quick Checklist Form):
 - o How many are injured
 - o Name of injured person(s) and the company they are working for
 - o What part of the body was injured
 - o Severity of injury
 - o Medical attention required
 - o Where they are sent to

- o What, When and Where it happened
 - o When it was reported and to Whom it was reported
 - o Names of Witnesses
 - Investigate the incident.
 - Obtain names of all involved parties and witnesses.
 - Record the names of other companies/ their personnel involved (if any).
 - Do not speculate or discuss accident with persons not involved.
 - Complete an accident investigation form and submit it to the main office.
 - Immediately implement corrective action to assure that there is no reoccurrence
 - Safety Audit is to follow within 24 hours. The Regional VP, General Superintendent, Project Superintendent and Safety Director are mandatory in the investigation.
22. Subcontractor agrees to indemnify, protect, defend, release, and save Construction manager and the Owner, and their respective officers, agents, employees, servants, and/or subcontractors harmless from and against any and all actions, lawsuits, claims, costs, expenses, fees, including reasonable attorney fees, loss, damage, or liability of any kind or nature, including damage to property, including loss of use thereof, even if owned, leased, or used by Subcontractor, or of injuries to persons, including death, whether employees of Subcontractor or others, and including fines, penalties, and costs of corrective measures for failure to comply with any safety or other governmental rules or regulations when such liability results from or on account of (a) any act or omission of or presence of Subcontractor or any of its officers, agents, employees, servants and/or sub-subcontractors arising out of or resulting from Subcontractor's performance of the Subcontract Work whether caused in whole or in part by the acts or omissions, negligent or otherwise, of Subcontractor or any of its officers, agents, employees, servants and/or sub-subcontractors, (b) from Subcontractor's negligence, breach of this Agreement, (c) which Construction manager may sustain or incur in connection with any litigation, investigation, or other expenditures incident thereto, including any suit instituted to enforce the obligations of this Agreement, or (d) from Defective Work and for costs and expenses necessary to correct, remove, replace and/or repair the Defective Work and any other work or property which may be damaged in correcting, removing, replacing, or repairing the Defective Work.
23. With respect to claims against Construction manager by Subcontractor's employees, Subcontractor agrees to expressly waive its immunity, if any, as a complying employer under the Subcontract Workers' Compensation Law, but only to the extent that such immunity would bar or effect recovery under or enforcement of this indemnification obligation. With respect to the State of Ohio, this waiver applies to Section 35, Article II of the Ohio Constitution and Ohio Revised Code § 4123.74.
24. In claims against any person or entity indemnified under these special conditions by an employee of Subcontractor, Subcontractor's sub-subcontractors, anyone directly or indirectly employed by them or for whose acts they may be liable, the indemnification obligation under this Section 3.4 shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for Subcontractor or Subcontractor's Sub-subcontractors under workers' or workmen's compensation acts, disability benefit acts or other employee benefit acts.
25. To the fullest extent permitted by law, Subcontractor shall indemnify, defend, and save harmless Construction manager and all of its shareholders, directors, officers, agents, employees, successors, and assign from and against all claims, causes of action, complaints, costs, or expense, including but not limited to attorney fees, arising out of or in connection with any mechanic's liens filed by a sub-

subcontractor or materialman who have supplied services or materials in furtherance of the Subcontract Work. In addition to the above and not by way of limitation, Subcontractor hereby agrees that upon receipt of written notice from Construction manager, Subcontractor will immediately provide the necessary bond to remove any mechanic's lien in accordance with the requirements of Ohio Revised Code § 1311.11 or may otherwise discharge the lien, and shall comply with all requirements of Chapter 1311 of the Ohio Revised Code in order to clear Owner's title to the subject real property of any lien placed on Owner's property by any such sub-subcontractor or materialman.

26. Subcontractor shall be responsible to Construction manager for acts and omissions of Subcontractor's employees, sub-subcontractors and their agents and employees, and other persons performing portions of the Subcontract Work under a contract with Subcontractor or claiming by, through or under Subcontractor and for any damages, losses, costs, and expenses including but not limited to reasonable attorney fees resulting from such acts or omissions.
27. The obligations of Subcontractor under these special conditions shall survive any partial or total termination of this the Subcontract Agreement.
28. Subcontractor warrants to the Owner, Architect, and Construction manager that materials and equipment furnished under this Subcontract will be of good quality and new unless otherwise required or permitted, and that the Subcontract Work will conform with the requirements of the Subcontract Documents. Work not conforming to the Subcontract Documents, including substitutions or revisions not specifically and properly approved and authorized in writing by either the Architect, Owner or Construction manager shall be considered Defective Work. 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.
29. If any of the Subcontract Work, which is the subject of this Subcontract, is found to be Defective Work within one (1) year after the date of substantial completion of the entire Work or within such later period of time as may be prescribed by law, the Subcontract Documents, or the terms of any applicable special guaranty or warranty required by the Subcontract Documents, then Subcontractor, at no cost or expense to the Owner or to Construction manager, shall promptly correct such Work after receipt of a written notice from Construction manager or the Owner to do so. The foregoing obligations shall survive final acceptance and payment of the Subcontract Work under the Subcontract, and the termination or completion of the Subcontract.
30. In addition to the warranty of Subcontractor set forth above, a one (1)-year written warranty shall be provided by each Subcontractor, except where a longer period may be required by law or by the Specifications or Subcontract Documents. Warranties shall be assembled and delivered to Construction manager by Subcontractor for all portions of the Subcontract Work of this Subcontract. Construction manager will not make final payment to the Subcontract until all warranties for the Subcontract Work under this Subcontract have been received and accepted by Construction manager and the Owner. All such warranties may be assigned by Construction manager or Owner without Subcontractor's consent.
31. Subcontractor shall indemnify, defend, and save Construction manager, its shareholders, directors, officers, agents, employees, successors and assigns harmless for all damage, costs, including reasonable attorney fees, claims, actions, lawsuits, loss or liability of any kind or nature, either direct or consequential, resulting to Construction manager or the Owner, from Defective Work and for costs and expenses necessary to correct, remove, replace and/or repair the Subcontract Work and any other work or property which may be damaged in correcting, removing, replacing, or repairing the Subcontract Work. This indemnification shall not be limited by any time period contained herein and shall survive any warranty period.
32. Upon written request by Construction manager and/or Owner, Subcontractor shall provide all relevant information needed to verify that employees who perform Work covered by the scope of an applicable labor agreement are receiving economic benefits equivalent to those required by that agreement. Subcontractor shall check all service(s) entering the Subcontract Work and shall keep, during the progress of the Subcontract Work and for seven (7) years plus the current year from the date of receipt

if Subcontractor is on Evaluated Receipts Settlement or Subcontractor's invoice date when Subcontractor is not on Evaluated Receipts Settlement, accurate and detailed records, and books of account, including without limitation, approval Forms, supporting documents, financial records, and accounts, with respect to all service(s) entering the Subcontract Work and all disbursements made in the performance of the Subcontract Work. Subcontractor shall cooperate with and upon reasonable notice permit a Construction manager and/or Owner representative access to all books, accounts, documents, vouchers, receipts, canceled checks, freight bills, memoranda and correspondence of Subcontractor which pertain to performance of the Subcontract Work and payment due or to become due under the Agreement. This provision shall survive the termination of the Agreement.

33. Subcontractor may be ordered in writing by Construction manager without invalidating this Subcontract, to make changes in the Subcontract Work within the general scope of this Subcontract consisting of additions, deletions or other revisions, including those required by Change Orders or Construction Change Directives to the Prime Contract issued after the execution of this Agreement, with the Subcontract Sum and the Subcontract Time being adjusted accordingly. Subcontractor, prior to the commencement of such changed or revised Work, shall submit promptly to Construction manager a written request for a claim for adjustment to the Subcontract Sum and Subcontract Time for such revised Work in a manner consistent with requirements of the Subcontract Documents.
34. Subcontractor shall make claims promptly to Construction manager for additional cost, extensions of time and damages for delays or other causes in accordance with the Subcontract Documents. When submitting a change proposal, Subcontractor shall include and set forth in clear and precise detail itemizations of labor and materials for all trades involved in the estimated impact on the construction schedule. Such claims shall be received by Construction manager not less than three (3) working days preceding the time by which Construction manager's claims must be made. Failure of Subcontractor to make such a timely claim shall bind Subcontractor to the same consequences as those to which Construction manager is bound, including but not limited to, a waiver of said claim.
35. Construction manager for its own convenience, with or without cause, shall have the right for any reason and at any time to terminate this Subcontract by written notice and to require Subcontractor to cease work hereunder. Such termination shall be effective at the time and in the manner specified in said notice and shall be without prejudice to any claims which Construction manager or the Owner may have against Subcontractor. If Subcontractor's right to proceed is so terminated, Construction manager may take possession of and utilize in completing the Subcontract Work such materials, equipment, and supplies as may be on or near the site of the Subcontract Work and suitable, therefore. In any such case of termination of the right to proceed, Subcontractor shall not be entitled to any further payment until the said Work shall be wholly finished, at which time, if the unpaid balance of the amount of the Subcontract shall exceed the expenses incurred by Construction manager in finishing or causing the Subcontract Work to be finished as well as all other charges, expenses or damage incurred in connection therewith, such excess shall be paid by Construction manager to Subcontractor. If such expenses and damage exceed the unpaid balance, Subcontractor shall immediately pay the difference to Construction manager.
36. Construction manager may, at any time, suspend Work or a portion thereof upon giving notice to Subcontractor in writing. Subcontractor shall strictly comply with the notice and shall minimize the cost of suspension. Any part of the Subcontract Work not suspended shall continue and be completed with full diligence by Subcontractor. When all or a portion of the Subcontract Work is to be suspended for any reason, Subcontractor shall cover over and securely fasten down all coverings to protect that portion of the Subcontract Work subject to suspension from injury from any cause, provided that, if such suspension is not the fault of Subcontractor, the appropriate Change Order is issued to reimburse costs incurred in performing as required herein.
37. In the event of termination of the Prime Contract by the Owner, Construction manager may assign this Subcontract to the Owner, subject to the Owner's agreement and further subject to the provisions of the Prime Contract and to the prior rights of the surety, if any, obligated under bonds relating to the Prime

Contract. Upon Owner's election to retain Subcontractor pursuant to the terms of this Subcontract Agreement, Subcontractor shall complete the unperformed obligations under this Subcontract Agreement and, if requested by the Owner, shall enter into an appropriate agreement evidencing the fact that Subcontractor is bound to the Owner in the way said Subcontractor has been bound to Construction manager.

38. Subcontractor shall not assign the Subcontract Work of this Subcontract without the written consent of Construction manager, nor subcontract the whole or part of this Subcontract without the written consent of Construction manager.
39. Subcontractor shall be liable for all direct and consequential damages arising out of Subcontractor's breach of this Subcontract. Subcontractor shall: (a) submit to Contractor within ten (10) days of the date of transmission of this Subcontract to Subcontractor a detailed, proposed schedule for the Subcontract Work for Contractor's use in preparing an overall progress schedule for the entire Work and its several parts under the Contract Documents; (b) begin the Subcontract Work promptly upon Contractor's order to do so; (c) coordinate and perform the Subcontract Work, and its several parts, diligently and promptly and in such order and sequence as Contractor may from time to time direct and as will assure its efficient and timely prosecution and will not delay completion of the entire Work and its several parts under the Contract Documents; and (d) furnish at all times sufficient, qualified and competent forces and supervision, and adequate, conforming and usable materials, equipment, plants, tools and other necessary things, to achieve progress according to Contractor's current progress schedule, including any specific schedule for the Subcontract Work attached hereto and any revisions thereof by Contractor. Subcontractor shall notify Contractor immediately by telephone and confirm in writing within seventy-two (72) hours, if Subcontractor finds that any item cannot be delivered as required to maintain Contractor's progress schedule. Subcontractor also agrees to be bound by such modifications to the Project schedule as are discussed at the weekly job meetings and are contained in the minutes of those meetings unless written objection is delivered in writing by Subcontractor within forty-eight (48) hours of the occurrence of such meeting. The Subcontract Work shall be performed during regular working hours except that, in the event of emergency or when necessary to, Work shall be performed at Subcontractor's cost and expense (including Contractor's standby and other general conditions costs) on night shifts, overtime, Saturdays, Sundays, holidays and at other times, if permission to do so has been obtained in writing from Contractor. Without limiting the requirements of the preceding sentence, if the progress of the Subcontract Work or of the Project has been delayed by any fault, neglect, act, or failure to act of Subcontractor or any of its subcontractors or suppliers, Subcontractor shall work such overtime, at Subcontractor's cost and expense as aforesaid, as Contractor shall deem necessary or desirable to make up for all time lost and to avoid delay in the completion of the Subcontract Work or the Project. The failure by Contractor to direct Subcontractor to engage in such overtime work shall not relieve Subcontractor of the consequences of its delay Contractor may direct acceleration of the Subcontract Work in order that it may be performed in advance of the schedules, time requirements and Project requirements. If so directed, Subcontractor shall increase its staff or work overtime, or both. Subcontractor will not be entitled to additional compensation for work performed outside of regular working hours, except as authorized and accepted in writing by Contractor. Provided that Subcontractor is not in default under the Subcontract, and Contractor has issued the aforesaid authorization, there shall be added to the Price an actual out-of-pocket amount equal to: (i) additional wages actually paid, at rates which have been approved in advance in writing by Contractor; (ii) taxes imposed by law on such additional wages; and (iii) premiums for worker's compensation and liability insurance if required to be paid on such additional wages
40. Should Subcontractor be obstructed or delayed in the commencement, prosecution, or completion of the Subcontract Work without fault on its part, and by reason of causes which would entitle the Contractor to an extension of time under the Contract, then Subcontractor shall be entitled to an extension of time only to perform the Subcontract Work which shall be equal to the extension of time to which the Contractor is entitled and granted by the Owner but no claim for extension of time on account of delay shall be allowed unless a claim in writing therefor is presented to Contractor with reasonable diligence but in any event not later than seventy-two (72) hours after the commencement of such claimed delay. The entitlement to an extension is absolutely conditioned upon Subcontractor's

timely submission of the aforesaid written notice. Subcontractor expressly agrees not to make, and hereby waives, any claim for damages, including those resulting from increased labor or material costs, on account of any delay, obstruction or hindrance for any cause whatsoever, whether or not foreseeable and whether or not anticipated including, but not limited to, causes that would entitle the contractor to an extension of time under the Contract, and agrees that the sole right and remedy therefor shall be an extension of time in accordance with this Section. Moreover, Subcontractor shall not be allowed an extension of time unless Subcontractor has established to Contractor's satisfaction that the delay claimed by Subcontractor is to a portion of the Subcontract Work on the critical path of the Subcontract Work schedule and that Subcontractor could not have reasonably anticipated the delay.

41. Based upon applications for payment submitted to Construction manager by Subcontractor, corresponding to Applications for Payment submitted by Construction manager to the Architect, and Certificates for Payment issued by the Architect, Construction manager shall make progress payments on account of the Subcontract Sum to Subcontractor. Invoices must be submitted on a form satisfactory to Construction manager in its discretion. The sum to be paid to Subcontractor for the performance of the Subcontract Work included in this Subcontract shall be in current funds, subject to additions and deletions as hereinbefore provided and that such sum shall be paid by Construction manager to Subcontractor within ten (10) days after Construction manager receives corresponding payments for said work from the Owner and that final payment, providing however that if this Agreement provides for retainage, then the payments by Construction manager to Subcontractor will be made by Construction manager to Subcontractor within ten (10) days after such retainage payments are received by Construction manager from the Owner.
42. Each Subcontractor and Sub-subcontractor are bound by the conditions set forth of all contract documents and are responsible for their approval of the schedule and each additional updated schedule by providing their signature. Failure to meet these requirements set forth in the schedule may result in withholding of Subcontractor, Sub-subcontractor payments and/or associated liquidated damages to each sub as they become deficient
43. Each application for payment shall be based upon the most recent schedule of values submitted by Subcontractor in accordance with the Subcontract Documents. The schedule of values shall allocate the entire Subcontract Sum among the various portions of the Subcontract Work and be prepared in such form and supported by such data to substantiate its accuracy as Construction manager may require. This schedule, unless objected to by Construction manager, shall be used as a basis for reviewing Subcontractor's applications for payment.
44. Applications for payment submitted by Subcontractor shall indicate the percentage of completion of each portion of the Subcontract Work as of the end of the period covered by the application for payment. Construction manager reserves the right to reasonably reduce the percentage completion based upon Construction manager's observations of the Subcontract Work.
45. Lien waivers will be furnished with each payment to Subcontractor and must be signed by Subcontractor and returned to Construction manager within three (3) days of receipt. Construction manager will not make subsequent payments until lien waivers have been returned and received.
46. If at any time there shall be evidence of any lien or claim for which if established Construction manager or Owner might become liable and which is chargeable to Subcontractor or if damage shall be caused by Subcontractor to other work, Construction manager shall have the right to retain out of any payment then due or thereafter to become due to Subcontractor an amount sufficient to indemnify itself and Owner for any loss or damage, including legal fees and other disbursements which either may sustain in discharging such lien or claim. If Construction manager or Owner shall discharge such lien or claim after all payments are made, Subcontractor shall reimburse to Construction manager all monies that Construction manager or Owner shall pay in discharging such lien or on claim against such premises and all expenses incurred in connection therewith, including reasonable attorney fees.

47. No payment made under this Subcontract shall be conclusive of the proper performance of this Subcontract, either wholly or in part; and no payment, including final payment shall be construed to be an acceptance of Defective Work or improper materials, nor shall entrance and use by Owner constitute acceptance of the Subcontract Work hereunder or any part thereof.
48. Final payment, constituting the entire unpaid balance of the Subcontract Sum, shall be made by Construction manager to Subcontractor when the Subcontract Work is fully performed, including the Architect's punch list, in accordance with the requirements of the contract Documents, the Architect has issued a Certificate for Payment covering Subcontractor's completed Work and Construction manager has received payment from the Owner.
49. Before issuance of the final payment, Subcontractor shall submit evidence in affidavit form satisfactory to Construction manager that all payrolls, bills for materials and equipment, and all known indebtedness connected with the Subcontract Work have been satisfied, along with a final lien waiver from all of Subcontractor's subcontractors and materialmen waiving all lien rights for the Subcontract Work.
50. Subcontractor shall purchase and maintain and shall cause its sub-subcontractors to purchase and maintain insurance in compliance with Contractor's obligations set forth in the Subcontract Documents, including but not limited to the types of coverage and limits of liability set forth below and incorporated by reference herein ("Coverages").
 - A. Commercial General Liability Insurance on ISO form CG 00 01 10 01 (or substitute form providing equivalent coverage). The coverage available to Construction manager and the Owner, as Additional Insureds, shall not be less than One Million Dollars (\$1,000,000.00) per occurrence, Two Million Dollars (\$2,000,000.00) general aggregate (subject to a per project general aggregate provision applicable to the project), Two Million Dollars (\$2,000,000.00) Products/Completed Operations Aggregate, and One Million Dollars (\$1,000,000.00) Personal and Advertising Injury limits. Such insurance shall cover liability arising from premises, operations, independent contractors, products/completed operations, personal and advertising injury, and liability assumed under an insured contract (including the tort liability of another assumed in a business contract). There shall be no endorsement or modification of the Commercial General Liability form arising from pollution, explosion, collapse, underground property damage or work performed by subcontractors.
 - B. Bodily Injury and Property Damage Liability under an Automobile Liability Policy which should provide and include coverage for Owned Automobiles and Hired and Non-Owned Automobiles, in the amount of One Million Dollars (\$1,000,000.00) per accident.
 - C. Workers' Compensation to statutory limits and employer's liability insurance to a limit of One Million Dollars (\$1,000,000.00) for bodily injury caused by accident and One Million Dollars (\$1,000,000.00) for bodily injury by disease, both being applicable to all employees engaged in the Subcontract Work.
 - D. Excess Liability Comprehensive Liability Insurance to a combined single limit of One Million Dollars (\$1,000,000.00) for bodily injury and property damage claims arising out of any one accident.
51. Coverages required to be maintained by Subcontractor pursuant to this Agreement shall be of sufficient type, scope, and duration to ensure coverage for Construction manager and Owner for liability related to any manifestation date within the applicable statutes of limitation and/or repose which pertain to any work performed by or on behalf of Construction manager or Owner in relation to the Subcontract Work. All Coverages shall be placed with an insurance company duly admitted in the State of Ohio and shall be reasonably acceptable to Construction manager. All insurance carriers issuing the Coverages shall maintain an A.M. Best rating of "A- "or better.

52. Subcontractor shall provide Construction manager, prior to the commencement of the Subcontract Work, with a Certificate of Insurance and Additional Insured Endorsement on ISO form CG 20 10 11 85 (or substitute form providing equivalent coverage) or on the combination of ISO forms CG 20 10 10 01 and CG 20 37 10 01 (or substitute forms providing equivalent coverage) naming The State, Construction manager Construction, Inc., Steubenville School District, Hasenstab Architects as Additional Insureds thereunder on a primary, non-contributory basis, meaning that additional insured coverage shall apply as primary insurance with respect to any other insurance afforded to The State, Construction manager Construction, Inc., Steubenville School District, and Hasenstab Architects. Coverage shall be afforded to the additional insureds whether or not a claim is in litigation. The Certificate of Insurance and the insurance policies required by this Agreement shall contain a provision that coverages afforded under the policies will not be canceled or allowed to expire until at least 30 days' prior written notice has been given to Construction manager. Not less than two (20) weeks prior to expiration, cancellation, or termination of any such policy, Subcontractor shall supply Construction manager with a new and replacement Certificate of Insurance and Additional Insured Endorsement as proof of renewal of said original policy. Said new and replacement endorsements shall be similarly endorsed in favor of The State, Construction manager Construction, Inc., Steubenville School District, and Hasenstab Architects as set forth above. If any of the foregoing insurance coverages are required to remain in force after final payment and are reasonably available, an additional certificate evidencing continuation of such coverage shall be submitted with the final application for payment as required in these special conditions. If any information concerning reduction of coverage is not furnished by the insurer, it shall be furnished by Subcontractor with reasonable promptness according to Subcontractor's information and belief.
53. Subcontractor waives all rights against (1) Construction manager and any of its subcontractors, sub-subcontractors, agents and employees, and (2) the Owner, the Architect, the Architect's consultants, separate contractors, and any of their subcontractors, sub-subcontractors, agents and employees for damages caused by fire or other perils to the extent covered by property insurance applicable to the Subcontract Work, except such rights as they may have to proceeds of such insurance held by the Owner as fiduciary. Subcontractor shall require of Subcontractor's Sub-subcontractors, agents, and employees, by appropriate written agreements, similar waivers in favor of other parties enumerated herein. The policies evidencing the Coverages 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.
54. Subcontractor agrees for itself and for its employees and agents to hold all drawings, specifications, contract provisions, and any other information supplied by Owner and/or Construction manager, or obtained or produced by Subcontractor in the performance of the Subcontract Work, in strict confidence and shall use its best efforts to prevent disclosure of such information to any third party or to any employee not directly employed in performance of the Subcontract Work. Subcontractor agrees not to use any such documents or information except in connection with its performance of the Subcontract Work hereunder.
55. If, at any time, Owner and/or Construction manager requests, Subcontractor shall execute and cause its employees, subcontractors, and material suppliers to execute non-disclosure agreements, adequate in the opinion of Owner and/or Construction manager to protect any confidential or proprietary information disclosed to such parties.
56. Neither party shall issue, nor permit to be issued any press release, advertisement or literature of any kind nor conduct or permit to be conducted any interview or news conference, referring to Owner and/or Construction manager, except upon prior written approval of Owner and/or Construction manager.
57. All notices and requests in connection with this Agreement shall be given or made upon the respective parties in writing and shall be deemed as given as of the day it is deposited in the U.S. mail, postage

prepaid, certified or registered, return receipt requested, or with a reputable overnight carrier such as Federal Express or United Parcel Service, and addressed to the parties at the addresses set forth herein, which addresses may be changed by providing written notice to the other party. Should signatures be required for execution, they may be done in person or by facsimile signature, which shall be deemed as original. Facsimile signatures on lien waivers or other documents will be deemed to be as valid as the original signature

58. No provision contained in the Subcontract Documents shall create or give to any third party any claim or right of action against the Owner, Construction manager or Subcontractor except as specifically provided herein.
59. Construction manager Construction is an equal opportunity employer. Whenever possible, Construction manager requests the use of qualified minority and female employees on its projects.
60. No modification of these special conditions, or waiver of any terms of these special conditions, shall be effective without a writing signed by both parties.
61. The Project Builders Risk Policy carries a \$25,000.00 deductible per event. The contractor or subcontractor making claim against the Policy shall be responsible for the deductible. In the event multiple subcontractors are claiming

END OF SECTION

SECTION 011000

**Steubenville City School District
STEM Building**

SUMMARY OF WORK

0.01 PROJECT GENERAL DESCRIPTION

- A. The **“Project”** consists of the construction of a New 41,000 sf STEM School Facility for the Steubenville High School STEM Program located next to the existing Steubenville High School in Steubenville Ohio, 43953.
- B. The **“Work”** performed under this bid event is as follows;
The work includes but is not limited to: Site work, Concrete, Masonry, Steel, Carpentry & Specialties, Roofing, Windows, Storefront, & Curtainwall Glazing & Entrances, Metal Studs, Gypsum Wallboard & Acoustics, Flooring, Ceramic Tile, Painting, Elevator, Fire Protection, Plumbing, HVAC, Electrical and Technology Cabling - all in accordance with the Project Drawings and Specifications that follow. Bid Packages are further delineated throughout the remainder of this Section.
- C. The Owner of the Project is Steubenville School District, 611 N 4th Street, Steubenville Ohio 43952.
- D. The Construction Manager is Grae-Con Construction Inc., 880 Kingsdale Road, Steubenville, Ohio 43952.
- E. The Architect is Hasenstab Architects, 190 North Union Street, Suite 400 Akron, Ohio 44304.
- F. An Independent Testing Agency, hired and paid for by the Owner, will provide field and laboratory testing services for the Project. The Subcontractor requiring testing is obligated to schedule testing services at least 24 hours in advance. If it found that the scheduled testing is not or will not be ready by the scheduled time, Subcontractor is required to cancel at least (2) hours in advance, or the cancellation fee will be deducted from Subcontractor’s contract via Change Order.
- G. The Project is to be built in a single phase. The project will be constructed under a multiple Subcontracting arrangement direct with the Construction Manager. All bids should be based upon LUMP SUM proposals.
- H. Commissioning: When applicable, participate in and perform commissioning process activities in coordination with the Commissioning Agent (CxA). Refer to Division 01 “Project Management and Coordination”.
- I. Subcontracts are separate contracts between the Construction Manager and separate subcontractors, representing significant construction activities. The work of each subcontract is performed concurrently with and closely coordinated with construction activities performed on the Project under other subcontracts in accordance with the Project Schedule. The Project Schedule is specific to the requirements of this project and serves to identify activities and their relationship to the timely completion of the contract by all. The Project Schedule is based upon the Bid Summary Schedule included with these Contract Documents. Each Subcontractor as a condition of the contract documents agrees to participate in a cooperative effort to meet and/or improve upon the schedule expectations (completion) and to perform the “Work” in a manner as determined best for the Project and Project “Team” as a whole.

- J. When a conflict exists between the scopes of work, as identified on the drawings, versus the assigned scope of work in this summary of work specification section, the summary of work specification section supersedes any assigned scope of work on the drawings.
- K. Each Subcontractor is required to meet the LEED requirements detailed within the specification sections relevant to their bid package
- L. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 01 Specification Sections.

0.02 BID PACKAGE(S) SCOPE(S) OF WORK

- A. The specific assignment of work per bid package is described in narratives and lists of specifications. The inclusion of a Specification Section indicates that the Subcontractor has primary or major responsibility for that Section. It does not preclude other Subcontractors from also having responsibilities in that Section. Similarly, exclusion of a Section from a bid package does not exempt that Subcontractor from having associated responsibilities within the Section. The narratives (special requirements) following the Specification lists further refine and elaborate a bid package's scope. **The term "provide" as used herein shall be defined as "provide all labor, materials, tools, equipment, services, and supervision necessary to complete all work."**

0.03 GENERAL PROJECT REQUIREMENTS

- A. Each Subcontractor shall review all drawings and all specifications relative to the "Project", including those drawings and specifications not directly pertaining to his own immediate scope of work but in related bid packages, as well as those drawings issued "For Reference Only", to ensure that each contractor has completely considered and included all elements of the work in his bid package. Each subcontractor shall include an 100% payment and performance bond. This will ensure that the sum of all Bid Packages will provide a complete Project.
- B. Each Subcontractor shall review the site utilization plan. All construction traffic and deliveries are required to use the construction entrance 48 hour advance notice to the Construction Manager. Violations of these construction traffic restrictions may be subject to a punitive fine of \$500 per occurrence administered via deduct change order to the responsible subcontractor. The safety of students, parents, visitors, & staff and the unimpeded operations of the school district are of the utmost importance and construction personnel shall consider this the highest priority throughout the construction duration.
- C. Each Pre-Qualified Subcontractor will be sent a link to one set of Construction Documents electronically in PDF format. Electronic CAD documents will be provided for Subcontractors' use.
- D. Each Subcontractor is responsible for the effect of their work progress and the Substantial Completion of the project. Each Subcontractor has the responsibility to comply with the Project requirements including coordination and timely submission of needed decisions, submittals, coordination drawings, material deliveries, sufficient equipment, and manpower so as to achieve the project schedule dates collectively as the group of Subcontractors and not to delay any other Subcontract or Project activity. Each Subcontractor is equally responsible for the performance of Subcontractors under their authority as if the work was performed directly.
- E. Each Subcontractor shall demonstrate its good faith efforts to comply with the utilization goals established for minority and women employees and submit documentation to the CM. Each subcontractor shall assist the CM as required with submission of the monthly completed Ohio

Construction Contract Information Report - Input Form 29 (I-29) to the State's Equal Opportunity Coordinator ("EOC").

- F. As defined by the description of bid packages, all applicable Subcontractors are required by law to supply domestically produced steel products used for load bearing structural purposes.
- G. Throughout the performance of the work, each Subcontractor shall be enrolled in and remain in good standing in the Ohio Bureau of Workers' Compensation ("OBWC") Drug-Free Safety Program ("DFSP") or a comparable program approved by the OBWC. In addition, each subcontractor shall require all lower-tier subcontractors to be enrolled in and remain in good standing with an approved DFSP.
- H. At the time of execution of the Subcontract Agreement, and no less than 14 days before any work is to be performed by a lower-tier subcontractor, each Subcontractor shall submit to the CM a "Subcontractor and Material Supplier Declaration" form through which the Subcontractor identifies the lower-tier subcontractor.
- I. Each Subcontractor shall provide all necessary resources, including manpower, equipment, and supplies for work 40-hour work weeks. If the subcontractor becomes deficient and or falls behind, it is their obligation to work all necessary hours, including multiple shifts, weekends, and holidays, to meet the Project Substantial Completion Date. Failure of the Subcontractor to provide adequate resources to maintain the Project Schedule may lead to the CM supplementing the Subcontractor's workforce or equipment or terminating the Subcontractor's Contract.
- J. Each Subcontractor shall employ multiple crews as necessary to maintain the project schedule. Each crew is to be furnished with separate equipment and other means necessary to continue the work and maintain the Project Schedule.
- K. Each Subcontractor shall, if requested by the CM, review any Schedule Updates, and identify crew size and total resource hours for each activity in the schedule that is relevant to the work of that Subcontractor's bid package. Failure to provide this information may result in withholding of Subcontractor payments.
- L. The construction manager will hold required scheduling meetings. The subcontractors will be required to provide information for this projects schedule. The CM will then issue the bid Construction Progress Schedule to all Subcontractors for their signature indicating understanding and acceptance of the Schedule. Each Subcontractor shall then be required to provide monthly update information to the CM and shall sign off indicating understanding and acceptance of the Updated Schedule. Failure to provide schedule update information or schedule acceptance signatures may result in withholding of Subcontractor payments and/or associated liquidated damages to each sub as they become deficient.
- M. If the construction Manager does not have its work on the project substantially complete by the date for substantial completion identified in the applicable GMP amendment, the construction manager shall pay the Owner (and the Owner may set off from sums coming due the construction manager) liquidated damages in the amount of \$1,000 per day for each day beyond the date for substantial completion that the work fails to be substantially complete. The construction manager acknowledges that such amount of liquidated damages represents a reasonable estimate of the actual damages that the owner will incur if the work is not substantially complete by the date for substantial completion. Liquidated damages are not intended to compensate the owner for any damages the owner incurs on account of any third-party claims attributable to the construction manager that are brought by others including separate consultants and separate contractors. Nothing in this section shall preclude the owner from recovering its actual damages from the construction manager for third-party claims or for damages not associated with delay.
- N. Each Subcontractor is required to have a competent supervisor at the Site whenever the Subcontractor is performing work.

- O. For all Subcontracts more than \$200,000, the Subcontractor shall submit an outline of the qualifications and experience of the Subcontractor's proposed project manager and proposed superintendent, including references, to the CM at the time of execution of the Subcontract Agreement, and no less than 14 days before the Subcontractor is scheduled to begin Work on the Site. The Subcontractor shall not replace their project manager or superintendent without prior written approval of the CM.
- P. All Subcontractors will be required to provide all work needed to install the work of their subcontract in conjunction with the Project Schedule.
- Q. Where conflicts exist between drawing and specification requirements, each Subcontractor shall be responsible to include the more stringent requirement in its bid.
- R. Each Subcontractor shall clean and/or repair/replace all damaged work or existing conditions affected by the installation of their work.
- S. Each Subcontractor shall include in their bid working all 40 hour work weeks to maintain the project schedule, until all applicable work associated with said subcontract is complete. No further request for payment will be acknowledged for these work hours. Acknowledge and acceptance of these work hours is accepted by submission of subcontractor's bid.
- T. Each Subcontractor shall comply with all federal, state, and local safety regulations to ensure a safe working environment for all their employees and subcontractors as well as any vendors, visitors or other person(s) who may have legitimate cause to be present at the work site. It is the intent of this requirement that all individuals present at the jobsite be provided the protection from hazards inherent to this work as is required by law. Each subcontractor shall be fully and totally responsible for the safety of their own personnel and that of their subcontractors providing work under their contract umbrella including furnishing all necessary training and equipment as may be required by law or specific to this project and/or bid package. Each contractor shall develop and implement a written Safety and Emergency Plan specific to this project and shall supervise and control all work in such a manner that all work is performed safely. The Owner, the Architect and the Construction Manager accept no risk and no responsibility whatsoever for the safety of subcontractor personnel during the construction of the Project. The Subcontractor accepts these conditions and responsibilities by their submission of a bid for the Project, and daily affirms these conditions and responsibilities by their continued participation in the Project.
- U. Each Subcontractor shall comply with all OSHA standards pertinent to the work of their subcontract.
- V. All person/s working on site must review and accept Grae-Con Construction's safety orientation prior to beginning any work. All individual employees performing work on this job must sign Grae-Con Construction's safety orientation paperwork in advance of beginning any work activities. Contractors are required to complete a safety task analysis (STA) at the request of the CMR prior to commencement of work. Grae-Con Construction mandates that ALL workers on the project site wear hard hats and eye protection. Failure to comply with these requirements may result in immediate and permanent removal from the project site.
- W. Each Subcontractor shall provide a copy of its site-specific written Safety and Emergency Plan and Material Safety Data Sheets (MSDS's) for any material to be used at the site. These documents shall be delivered to the CM's field office no less than ten (10) days prior to the Subcontractor starting work on the project.
- X. All testing will be per specifications and as mandated by Authorities Having Jurisdiction. Subcontractor must coordinate the need for testing and inspection with the CM at least twenty-four (24) hours in advance. If it found that the scheduled testing is not or will not be ready by the scheduled time, Subcontractor is required to cancel at least (2) hours in advance, or the cancellation fee will be deducted from Subcontractor's contract via Change Order.

- Y. During the construction period the Subcontractors shall have practical use of the site (building site and other designated areas as approved by the Owner and/or Construction Manager) for construction operations. Each Subcontractor's use of the site is limited by the Owner's right to perform work or to retain other subcontractors on portions of the Project and the Construction Manager's right to manage overall site usage. Unauthorized use of Owner's Premises or Facilities will be cause for removal of the offending employee(s) and possible cancellation of contract.
- Z. The Owner and Construction Manager reserve the right to immediately eject from the Owner's property, including the construction site, any individual, whether direct supervisor, manager, employee, or subcontractor, whose behavior is determined to be inappropriate. Failure to remove the individual immediately and permanently from the premises upon notification by the Construction Manager shall be cause for immediate termination of the Subcontract. In the event the individual is the Subcontractor's on-site supervisor or project manager, the Subcontractor shall submit for acceptance the name and resume of their proposed replacement within 24 hours.
- AA. Limit use of the premises to work areas indicated by the drawings and specifications unless otherwise specifically directed or allowed by written approval of the Construction Manager and Owner. Do not disturb portions of the site beyond the areas in which the Work is indicated and/or as required by your scope of work. Restore any disturbed conditions to the satisfaction of the Architect and Construction Manager.
- BB. The Owner reserves the right to occupy and to place and install equipment in completed areas of the site prior to Certificate of Contract Completion, provided such occupancy does not interfere with completion of the Work. Such placing of equipment and partial occupancy shall not constitute acceptance of the Work or warranty commencement.
- CC. Each Subcontractor shall give proper notice to affected utilities indicating when and where excavation / shut downs shall take place. This notice shall occur at least 10 (10) working days, excluding Saturdays, Sundays, and legal holidays, prior to commencing work. Each Subcontractor shall immediately alert occupants of nearby premises as to any emergency that may be created or discovered on or near the underground work. Any damages to underground utility lines must be immediately reported to the appropriate utility company and Construction Manager.
- DD. Each Subcontractor shall obtain and pay for all permits, governmental fees, licenses, and inspections necessary for the proper execution and completion of their portion of the work, which are customarily secured after the execution of the Subcontract unless otherwise noted. The overall building permit fee will be paid by The Owner; however, each Subcontractor is responsible to obtain any special permit(s) associated with the work of the Subcontractor.
- EE. Each Subcontractor shall obtain and pay to become licensed in the City of Steubenville as a project requirement.
- FF. Each Subcontractor shall apply for, pay for, and obtain permits for their construction trailers and associated temporary services. (*It is the responsibility of each Subcontractor requiring power to arrange for individually metered service through the electrical subcontractor and to connect at the locations provided. Connection and usage costs are by the subcontractor requiring the service.)
- GG. The current SHS "Applied Building" will be utilized for subcontractor office space during construction.
- HH. Each Subcontractor shall comply with all requirements and conditions of the NPDES general permit pertinent to the work of their Subcontract, including but not limited to, maintaining the Project's sedimentation and erosion control measures, maintaining records of its construction activities, removing materials no longer required, and taking proper action if there is a reportable quantity spill.

- II. The Construction Manager has established procedures for construction operations and decides on proper cooperation necessary to carry on the work most efficiently with least interference from and to all concerned. During the execution of the Work, each Subcontractor and their Subcontractors shall:
1. Provide sufficient advance notice of their intended work activities.
 2. State the nature and duration of the work activities and the essential or absolute minimum requirements necessary to allow the work to proceed.
 3. Review “means and methods” of construction with the Construction Manager and Architect prior to proceeding to determine if conditions caused by those means and methods are detrimental to the overall progress of the Project and/or to the quality of construction. The CM and Architect will have final say regarding any conflicts between Subcontractors and/or Disciplines.
 4. Review Shop Drawings, Product Data, and Samples noting discrepancies or anticipated problems in use of product.
 5. Obtain CM approval for proper timing and coordination of major segments of work activities.
 6. Participate in Coordination Meetings and provide information required for Schedule Updates.
 7. Subcontractors (and their Subcontractors) shall plan, schedule, and coordinate their work to maintain continuity of manpower, resources, and the work activities within their control.
 8. Submit requests for information or clarification and Product Submittals, all requiring response from the Architect or their consultants, in a timely fashion so as not to unnecessarily disrupt or delay the progress of construction. These submissions are to be made at the earliest possible opportunity and shall be in accordance with the Contract Specifications and Documents.
 9. Obtain in a timely fashion all permits and pay all fees, as required by all governing authorities and provide a copy to the Construction Manager.
 10. Recognize that the site can become congested; schedule deliveries and installation in a manner that will not unreasonably encumber the site/building or interfere with other subcontractor’s work.
 11. If one Subcontractor is furnishing materials to another Subcontractor for installation, said materials shall be coordinated and delivered in sufficient time for the installing Subcontractor to properly plan and prepare for the work. The Subcontractor furnishing the materials shall be responsible for delivery of the materials to the project site. The Subcontractor installing the materials shall be responsible for unloading, inspecting, inventorying, and protecting while storing these materials.
 12. Subcontractors shall cooperate with the Construction Manager in leaving out portions of the construction when deemed necessary and in the best interest of the project for access.
- JJ. Cooperate with the Construction Manager in maintaining control of the site:
1. Keep driveways, parking lots, public streets, and entrances serving the premises always clear. Do not use for construction parking, staging, or storage of materials. Use only areas as designated by the site utilization plan, project specifications, or as otherwise approved by the Construction Manager. The Construction Manager shall have final say with respect to the use of “shared” site access and facilities for the “Project” as a whole.
 2. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage to the areas indicated and/or as directed by the Construction Manager. If additional storage is necessary, obtain and pay for such storage off site.
 3. Remove all unused or unneeded Materials and Equipment from the jobsite immediately. Any “approved” stored materials remain the responsibility of the Subcontractor until installed otherwise accepted by terms of the contract.
 4. Subcontractors shall, at the direction of the CM, move any stored products which interfere with operations of the Owner and/or other Subcontractors.
 5. Maintain all required exit ways to comply with all governing codes and/or to facilitate access in and around the site. Remove mud on driveways immediately to keep from accumulating onto roads.
 6. Subcontractors shall provide storage containers for storage of tools & materials if the CM determines that storing these tools & materials inside the building would cause unnecessary congestion.

7. Parking for tradesmen will be assigned by the Construction Manager. No other parking will be allowed without written approval of the CM. Do not hinder traffic flow on the public roads surrounding the site. Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended,
 8. Work schedules and hours of operation MUST be with the knowledge of and approval of the Construction Manager. Normal working hours will be Monday through Friday, 7:00am to 4:00 pm. Advance notice of 72 hours is required to change and/or extend established work schedules. This is to allow the Construction Manager sufficient time to coordinate any necessary supporting personnel or activities. Any additional expense or cost caused by this changed or extended schedule beyond that required for normal operations is the responsibility of the Subcontractor requesting it unless otherwise approved by the Construction Manager. This includes any additional (beyond normal costs) incurred by supporting personnel and/or subcontractors if required.
- KK. If any field activity requires an acknowledgement and a signature from the Construction Manager, that signature shall be obtained by the responsible Subcontractor on the very same day of the activity's occurrence. For activities spanning more than one day, the responsible Subcontractor shall submit daily reports and obtain signatures daily on the same. Change order requests related to additional work performed on a "time & material" basis shall be submitted to the Construction Manager within 10 working days of completion of the work in the field. Failure to submit a change order request within this timeframe shall constitute the Subcontractor's waiver of rights to any additional compensation.
- LL. All correspondence from the Subcontractors shall be through the Construction Manager. The Construction Manager will, in turn, provide distribution to the Architect and Owner as required.
- MM. Use of Tobacco products is NOT permitted on the Owner's site. Each Subcontractor is required to enforce this policy with their own personnel and promptly provide disciplinary action to those who fail to comply, including, but not limited to removal of offender(s) from the Project.
- NN. Throughout the course of the Project each Subcontractor and their subcontractors shall dedicate manpower/resources as required by the contract documents, daily, to clean-up trash, construction debris, dust, dirt, etc. from their work activities. This includes broom cleaning all dust and dirt.
- OO. Each Subcontractor shall provide two (2) hard copies and one (1) electronic copy of all O&M Manuals and Product Warranties to be submitted to the Owner through the CM as part of the Project Closeout Requirements. This information is to be provided prior to commencing any Owner training & demonstrations required by the specifications, whichever is earlier. Failure to provide all O&M Manuals & Product Warranties in the required timeframe may, at the CMR's sole discretion, result in a punitive fine of \$1,000/day that these documents are not received.
- PP. Each Subcontractor shall provide the 01 33 00b Submittal Cover with every submittal. Cover is to clearly indicate submittal #, spec section, product identification, page # and line item of product being submitted. Submittals without the completed cover sheet may be rejected and returned to the Subcontractor.
- QQ. Submittals shall be provided in a timely fashion as required maintain the project schedule and to allow for a minimum of 2 weeks for the design team to review. The Subcontractor shall provide all required submittals within a minimum of 10 weeks of finalization of subcontract agreement. Failure to provide submittals in a timely fashion may, at the CMR's sole discretion, result in a punitive fine of \$1,000/day that these submittals are not received.
- RR. Each Subcontractor shall comply with all LEED requirements and submit all LEED documentation required for the project as requested by the Architect and defined in the specifications.

- SS. On a weekly basis, the Subcontractor shall prepare and submit to the CM a written report describing activities begun or finished during the preceding week; activities in progress and expected completion; activities to be started or finished in the upcoming 2 weeks; the Subcontractor's workforce size and equipment associated with those activities; and any other information requested by the CM. These weekly progress reports are to be provided to the CM at the weekly Progress Meeting.
- TT. At any time during which work of the Subcontract is being performed, or as requested by the CM, each Subcontractor shall be represented at every weekly progress meeting by a Person authorized with signature authority to make decisions regarding possible modification of the Contract Documents or Construction Progress Schedule. Failure of a Subcontractor to be represented at a weekly progress meeting may result in a \$500 punitive charge if deemed appropriate by the CM.
- UU. If it is apparent to the CM that the Subcontractor may be unable to meet critical path activities, Milestone Completion dates, or the Contract Completion date; the CM shall direct the Subcontractor to submit within 3 days a recovery plan to avoid or minimize the delay to the Project. A recovery plan shall include, but is not limited to, adjustments to one or more of the following: Workforce; Hours per shift; Shifts per workday; Workdays per week; Equipment.
- VV. Each Subcontractor shall take into consideration the usual weather and other conditions prevailing in the locality of the Project and shall anticipate adverse weather and/or seasonal conditions which will not be cause for delay claims or time extension requests.
- WW. Each Subcontractor must comply with the local, state, and county regulations and standards, including any applicable truck route and noise ordinances. Each Subcontractor will be required to submit to CM a copy of their current Contractor Registration with the City and County as applicable.
- XX. In addition to performing the daily clean-up and final clean-up requirements, each Subcontractor shall also completely clean all work of his Bid Package which either is, or receives, a finish treatment of some kind. Clean-up must be performed immediately if finishes will be adversely affected by waiting or immediately prior to the application of finishes if deemed acceptable by the CM without causing delays to such finishes.
- YY. Each Subcontractor is required to clean-up debris, re-grade and compact all areas that are affected by the installation of his work, and generally return grade to the required design standards. Each Subcontractor shall be responsible for repairs to the work of others damaged because of their work.
- ZZ. Each Subcontractor shall respond to any Proposal Request within 7 calendar days after receiving the Proposal Request using the required change order request form required for the project. The Subcontractor shall hold the Proposal Request valid and open for acceptance for at least 60 days. The Subcontractor's response to any Proposal Request shall include a written statement from the Subcontractor that the proposed adjustment to the Contract Sum or Contract Time is the entire adjustment associated with the change.
- AAA. Each Subcontractor shall submit one (1) electronic copy of certified payroll reports for the relevant period with each payment application.
- BBB. The Contracting Authority and Owner may examine all books, records, documents and other data of the Subcontractor related to the bidding, pricing, or performance of the Work for the purpose of evaluating any Subcontractor Payment Request, Proposal, Modification, or Claim. The Subcontractor is required to maintain complete and accurate business records at its principal place of business. These materials shall be made available at the office of the Subcontractor at all

reasonable times for inspection, audit, and reproduction until the expiration of 6 years after the date of Substantial Completion of all Work.

END OF SECTION

SECTION 011001

BID PACKAGES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes this project's separate Bid Packages
 - 1. Section 011001.01 "Sitework"
 - 2. Section 011001.02 "Paving Work"
 - 3. Section 011001.03 "Concrete"
 - 4. Section 011001.04 "Masonry"
 - 5. Section 011001.05 "Structural/Miscellaneous Steel"
 - 6. Section 011001.06 "General Trades"
 - 7. Section 011001.07 "Metal Panels"
 - 8. Section 011001.08 "Terracotta Panels"
 - 9. Section 011001.09 "Roofing"
 - 10. Section 011001.10 "Exterior & Interior Framing/Drywall/Interiors"
 - 11. Section 011001.11 "Glass & Glazing"
 - 12. Section 011001.12 "Tile"
 - 13. Section 011001.13 "Flooring"
 - 14. Section 011001.14 "Painting"
 - 15. Section 011001.15 "Polished Concrete"
 - 16. Section 011001.16 "Elevator"
 - 17. Section 011001.17 "Fire Protection"
 - 18. Section 011001.18 "Plumbing"
 - 19. Section 011001.19 "HVAC"
 - 20. Section 011001.20 "Electrical"

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

BID PACKAGE #01 – SITE WORK

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #01 – Site Work

The work of this #01 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 31 – Earthwork
31 10 00	Site Clearing
31 20 00	Earth Moving
31 22 19	Finished Grading
31 23 19	Dewatering
31 25 00	Erosion and Sedimentation Controls

	Division 33 – Utilities
33 05 00	Common Work Results for Utilities
33 10 00	Facility Water Distribution Piping
33 30 00	Facility Sanitary Sewers
33 41 00	Storm Utility Drainage Piping
33 46 00	Sub-Drainage

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and the City of Steubenville and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.

- B. This Subcontractor shall be responsible for construction layout relative to the performance of its own work and shall additionally provide certified verification of the installations if requested by the CM.
- C. This Subcontractor shall provide all “as built” record documentation from a Registered and Licensed Surveyor. As built drawings are to include all utility runs, tie in coordinates, sanitary and storm lines, structure coordinates, elevations, etc. for work installed under this bid package. Locations shall be noted from 2 property lines minimum. Final payment will not be released until the As Built drawings are received and the proper elevations are verified.
- D. This Subcontractor shall be responsible for all Storm Water Pollution Prevention Plan and Erosion & Sediment Control indicated in the contract documents including installation and maintenance of the concrete washout, inlet protection, sediment basins, silt fence, filter sock, temporary seeding, and regular inspections & reporting. Provide maintenance and record inspections of erosion control to Construction Manager following every rain event (0.5” of rain in a 24-hour period) or at minimum weekly should no rain event occur. Compliance with the erosion control plan and any government agencies having jurisdiction is the responsibility of this Subcontractor.
- E. This Subcontractor shall be responsible for site clearing & grubbing as required to complete the work of this bid package including tree removal and stump grinding.
- F. For the time period beginning on August 2022 to project completion, this Subcontractor is required to assume responsibility for the erosion & sediment control measures installed, including all required inspections and reporting. Maintenance and repairs to these measures within 24 hours of written notification from the Construction Manager. These erosion & sediment control measures include but are not limited to silt sock, silt fence, inlet protection and construction entrances. Maintenance and removal of the concrete washout area shall be by others. Failure to comply with this requirement may result in the Construction Manager completing this work at the expense of this Subcontractor with no additional written notification. In addition, this Subcontractor shall file as a Co- Permittee under the project's Ohio EPA stormwater discharge permit Notice of Intent.
- G. This Subcontractor shall be responsible for providing, maintaining, and removing inlet protection for all new storm sewer structures installed under this bid package.
- H. This Subcontractor shall be responsible for all site and utility demolition and subgrating required by the work of this bid package, including partial demolition of the asphalt pavement and Dock Street.
- I. This subcontract shall be responsible for all work associated with bio swale retainage area indicated on the drawings.
- J. This Subcontractor shall provide all new site storm and sanitary sewer structures & piping as indicated on the Contract Documents to within 5 feet of the new building, including but not limited to all required excavation, pipe bedding, storm sewer pipe and fittings, catch basins, manholes, curb inlets, backfill, and compaction.
- K. This Subcontractor shall provide all site water line work for the domestic water service, fire protection service, and Fire Department Connection line including but not limited to all required excavation, pipe bedding, water pipe and fittings, fire hydrants, vaults, back flow preventers, meter, thrust blocks, valves, valve boxes, backfill, and compaction. This Subcontractor shall provide site water lines to flanged connection points inside the building and shall be responsible to coordinate with the Plumbing and Fire Protection Subcontractors the proper location, height, and orientation of the flanged water line to correctly build the riser assemblies.

- L. This Subcontractor shall be responsible for coordinating all required inspections and approvals required by Authorities Having Jurisdiction for site utilities installed under this bid package. This Subcontractor shall be responsible for all Jefferson County Sanitary Engineer's inspection fees.
- M. This Subcontractor shall be responsible for flushing and disinfecting the entire site water line system. This Subcontractor shall provide a "Contractor's Material and Test Certificate for Underground Piping" and shall be responsible for coordinating with the Construction Manager and Authorities Having Jurisdiction to ensure pipe flushing is witnessed by all required parties.
- N. This Subcontractor shall be responsible for topsoil and permanent lawn seeding work as indicated on the Contract Documents.
- O. This Subcontractor shall include multiple mobilizations as necessary to complete the work of this bid package in accordance with the project schedule.
- P. This Subcontractor shall refer to Specification Sections 012300 Alternates and 015000 Temporary Facilities for additional scope of work requirements.
- Q. This Subcontractor shall refer to Specification Section 012100 Allowances for allowances to be included in this bid package.
- R. This Subcontractor shall be responsible to provide site dust control during the subcontractor's major construction activities timeframe, or the CM will hire a company to perform this work and deduct the cost from the Subcontractor's contract.
- S. This Subcontractor shall prepare the building pad elevation to within 8" below finish floor and seal the building pad at the end of the workday everyday by rolling and ensure positive drainage off the pad.
- T. This Subcontractor shall be responsible for all site grading and final grading to all required elevations. Exterior concrete areas shall be left to bottom of stone base elevation. Concrete contractor shall be responsible for granular base installation. Exterior grading will need to be coordinated with the concrete contractor.
- U. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #01

BID PACKAGE #02 – PAVING

SUMMARY OF WORK

RELATED DOCUMENTS:

A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #02 – Paving

The work of this #02 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
32 12 16	Asphalt Paving

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall be responsible for construction layout relative to the performance of its own work and shall additionally provide certified verification of the installations if requested by the CM.
- C. This Subcontractor shall be responsible to furnish and install of all sub-base granular materials and asphalt base paving materials per the contract documents.
- D. This Subcontractor shall provide all required paving line stripping and parking bumpers required.

- E. This Subcontractor shall be responsible for patching of pavement at existing 4th street where new sidewalks and curbing will be installed. Also, patching of asphalt to utility tie in at 4th street will also be included.

- F. This Subcontractor shall be responsible for coordinating all required inspections and approvals required by Authorities Having Jurisdiction for site utilities installed under this bid package. This Subcontractor shall be responsible for all Jefferson County Sanitary Engineer's inspection fees.

- G. This Subcontractor shall include multiple mobilizations as necessary to complete the work of this bid package in accordance with the project schedule.

- H. This Subcontractor shall refer to Specification Section 012100 Allowances for allowances to be included in this bid package.

- I. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #02

BID PACKAGE #03 – CONCRETE

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #03 – Concrete

The work of this #03 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 3 – Concrete
03 30 00	Cast-In-Place Concrete

	Division 7 – Thermal and Moisture Protection
07 21 00	Thermal Insulation
07 13 26	Self-Adhering Sheet Waterproofing
	Division 32 – Exterior Improvements
32 13 13	Concrete Paving
32 13 73	Concrete Paving Joint Sealants

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall be responsible for construction layout relative to the performance of its own work and shall additionally provide certified verification of the installations if requested by the CM.
- C. From the date the work of the interior concrete portion of this bid package commences until the final slab on deck is poured, this Subcontractor shall provide a mechanical sweeper capable of washing,

vacuuming, cleaning and flushing the street and pavement of all dirt and debris tracked from the site, daily, or more frequently if directed by the CM. No dirt or debris will be permitted to accumulate on existing pavements, or the CM will hire a company to perform this work and deduct the cost from the Subcontractor's contract.

- D. This Subcontractor shall be responsible for drainage and dewatering as required to perform the work under this Bid Package. Subcontractor shall discharge water per SWPP plan.
- E. This Subcontractor shall provide concrete placement methods as required to complete the work of this bid package including but not limited to concrete buggies, pumping, and hoisting.
- F. This Subcontractor is responsible for all tools, materials, equipment, and fuel necessary to properly perform work of this Bid Package in accordance with hot and cold weather procedures, and in accordance with the project schedule. Temporary building enclosure and building conditioning is not part of this bid package and will be controlled by the CM.
- G. This Subcontractor shall provide all concrete foundations/footers including excavation, off-site removal and legal disposal of spoils, formwork, granular fill, compaction and backfill necessary to complete the building foundation system.
- H. This Subcontractor shall provide all exterior concrete curbs, sidewalks, stairs, ramps, and concrete paving, including any/all foundations/footers (including sky bridge helical pile foundations) excavation, off-site removal and legal disposal of spoils, formwork, granular fill, compaction and backfill necessary to complete the exterior concrete.
- I. This Subcontractor shall provide all reinforcing steel and required accessories embedded in all concrete placed by this contractor. Vertical dowel bars shall be installed prior to placement of reinforcing steel. "Wet stabbing" of vertical reinforcing steel shall not be permitted.
- J. This Subcontractor shall provide all below grade water proofing in accordance with the contract documents including areas at the elevator pit. The fluid applied membrane air and water resistive barrier is not in this bid package and is included in the metal panel bid package.
- K. This Subcontractor shall provide any foundation perimeter drainage piping in accordance with the contract documents.
- L. This Subcontractor shall provide all below grade perimeter insulation and vapor barriers in accordance with the contract documents.
- M. This Subcontractor shall install all anchor bolts, leveling plates/nuts and embeds provided by Bid Package 5 Steel Subcontractor.
- N. This Subcontractor shall provide all non-shrink grout under all column base plates per specifications.
- O. This Subcontractor shall verify all anchor bolts are installed within tolerances required for setting the structural steel framing. This Subcontractor shall provide this certification no less than five (5) days prior to the scheduled start of structural steel installation in that area.
- P. This Subcontractor is responsible to install all sleeves through its work provided by others. This Subcontractor shall provide additional reinforcing steel around sleeves as indicated on the construction drawings.
- Q. This Subcontractor shall be responsible for all fine grading of sub-grade for concrete slab on grade work, and exterior concrete including necessary re-grading and excavation for thickened & depressed slabs. Slab on grade will pad elevation will be 8 inches below finish floor by the site work contractor and exterior concrete areas subgrade will be brought to bottom of stone by the site work contractor.

- R. This Subcontractor shall provide the elevator pit foundations and pad, including the elevator sump pump pit.
- S. This Subcontractor shall provide all concrete foundation wall waterproofing as indicated on the Contract Documents.
- T. This Subcontractor shall provide all concrete slabs on grade including forming, insets, granular base, vapor barrier/retarder, sequencing of pours, thickened slabs, expansion joints, control joints, reinforcing steel, welded wire fabric, finishing, curing, caulking, saw cuts, and wet curing.
- U. This Subcontractor shall provide the horizontal and vertical rigid insulation below slab-on-grade at exterior perimeter walls.
- V. This Subcontractor shall provide all interior and exterior joint sealants. Interior floors to receive polished concrete. Joint sealants will be provided by the polished concrete contractor and not this bid package.
- W. This Subcontractor is responsible for meeting the concrete floor flatness and levelness requirements of the project specifications. In addition to meeting the specified FF/FL at initial placement, this Subcontractor shall be responsible for grinding and filling of the concrete slab immediately prior to flooring installation to resolve any flatness and levelness issues caused by the concrete curing, shrinking, and cracking.
- X. This Subcontractor shall provide all exterior frost slabs as indicated in the Contract Documents.
- Y. This Subcontractor shall provide all elevated concrete slabs on metal decks including sequencing of pours, forming, reinforcement, curing, and protection.
- Z. This Subcontractor shall coordinate with the other Subcontractor to ensure proper elevation and proper slope to all floor clean-outs and floor drains.
- AA. This Subcontractor must verify/confirm slab curing methods will not have an adverse effect on slab moisture so that low VOC flooring adhesives (as required by LEED) can be installed at moisture contents required by manufacturers via Request for Information to The Design Team.
- BB. Equipment & housekeeping pads for various MEP equipment, including the exterior mechanical equipment, are included in this bid package.
- CC. This Subcontractor shall provide the concrete paving and all site concrete shall be by this subcontractor including all granular base.
- DD. This Subcontractor shall install all exterior gates at dumpster enclosure, Dock Street, and installation of generator and transformer enclosure.
- EE. This Subcontractor shall be responsible for maintenance and removal of the concrete washout area as required for the work of all subcontractors. Cleaning shall be conducted in such a manner as to prevent spilling of fluid or concrete to the ground or penetration of existing ground soil. The washout area must be maintained and regularly cleaned during this Project and removed and restored when directed by the Construction Manager. This Subcontractor shall respond to the Construction Manager's written request for cleaning and/or maintenance of the concrete washout area within 24 hours. Failure to comply with this requirement may result in the Construction Manager completing this work at the expense of this Subcontractor with no additional written notification.
- FF. This Subcontractor shall be responsible for the installation of the exterior bollards provided by the 05A contractor.

GG. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #03

BID PACKAGE #04 – MASONRY

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #04 – Masonry

The work of this #04 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 4 – Masonry
04 20 00	Unit Masonry
	Division 7 – Thermal and Moisture Protection
07 21 00	Thermal Insulation

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.

- B. This Subcontractor shall be responsible for construction layout relative to the performance of its own work and shall additionally provide certified verification of the installations if requested by the CM.
- C. This Subcontractor shall furnish and install all masonry units and brick veneer for the complete masonry construction of the building. Include all CMU, cast stone, reinforcing, grout, brick veneer, mortar, window heads/sills, screen walls and all site masonry in accordance with the Contract Documents. This Subcontractor shall furnish and install all unit masonry and brick masonry accessories, including flashings, termination bars, drip edge, pre-formed end dams, sealants, weeps, fabrics, wall ties, mortar net, wall/head/sill insulation and anchors pursuant to the Contract Documents.
- D. This Subcontractor is responsible for all tools, materials, equipment, and fuel necessary to properly perform work of this Bid Package in accordance with hot and cold weather procedures, and in accordance with the project schedule. The cost of any winter conditions measures required to complete this work in accordance with the project schedule, including but not limited to tenting, heating equipment and fuel costs, and heating of materials shall be included in the base bid.
- E. This Subcontractor shall be responsible for drainage and dewatering of the work under this Bid Package. Subcontractor shall use pumps and temporary ditching as necessary to remove water from the site and trenches per the SWPP plan.
- F. This Subcontractor shall provide mockups as indicated in the Contract Documents.
- G. This Subcontractor shall provide and install masonry reinforcing steel and grout as required and indicated in the Contract Documents. Vertical reinforcing steel shall be installed prior to grout installation. "Wet stabbing" of vertical reinforcing steel shall not be permitted.
- H. This Bid Package includes the installation of embedded items (masonry embeds), including all Steel Lintels; Bolts; Bearing Plates; Embedded Angles, Beams, or Plates; and other miscellaneous embedded items as identified by the drawings and specifications. Through wall pipe sleeves and any embedded items specific to a given trade not otherwise identified by drawings or schedules will be furnished and located by the trade requiring the penetration and/or embed, and subsequently installed by the Masonry Subcontractor.
- I. This Subcontractor shall provide openings in masonry walls as required for installation of structural steel elements and shall provide fire safing or compressible filler around structural steel penetrations.
- J. This Subcontractor shall coordinate with the other bid packages and shall be responsible for the installation of all embedded inserts and regrets furnished by Subcontractors.
- K. This Subcontractor shall be required to attend pre-installation meetings with other Subcontractors and the Roofing, metal panel, and terracotta cladding Manufacturers to review all masonry flashings. This Subcontractor shall review all flashing details with the CM and Architect prior to installation.
- L. This Subcontractor shall coordinate and work with all other Subcontractors to ensure all masonry rough-ins, box outs, conduits, or embedded items regarding equipment, devices and materials is placed within the masonry construction. This Subcontractor is responsible for the final alignment and protection of embedded rough-ins including corrective work to ensure compliance with the Contract Documents. Other Subcontractors are responsible to provide the appropriate material and manpower to ensure the work is installed in the correct locations and in accordance with the project construction schedule per the Contract Documents.
- M. This Subcontractor is responsible for providing rough openings in masonry construction for all items that are to be recessed mounted.

- N. This Subcontractor shall be responsible for providing access and coordinating masonry openings for plumbing and mechanical piping, HVAC duct, electrical devices, conduits, fire suppression equipment, and technology sleeves.
- O. This Subcontractor shall engineer, provide, and maintain temporary masonry wall bracing as required.
- P. This Subcontractor shall provide all exterior foundation wall rigid insulation.
- Q. This Subcontractor shall be responsible for cement parging of below grade exterior veneer as indicated on the Contract Documents. This Subcontractor shall provide all exterior spray foam and foam filled insulation in CMU walls as indicated on the Contract Documents including all required thermal barriers, transition membranes, and accessories.
- R. This Subcontractor shall be responsible to coordinate with other Subcontractors to ensure proper installation of transitions from exterior veneer air barrier and cavity insulation to exterior metal wall panel air barrier and cavity insulation.
- S. This Subcontractor is responsible for grouting of hollow metal frames in masonry walls. Frames shall be installed by others. This Subcontractor shall take care to ensure that frames remain true, plumb, level and properly aligned as adjacent wall construction is completed.
- T. This Subcontractor shall provide all temporary cover/protection as required for installation of all masonry construction. Every masonry wall must be covered each night to not allow water directly into the interior of masonry units and assemblies.
- U. This Subcontractor shall final clean and seal all exterior masonry pursuant to the Contract Documents.
- V. This Subcontractor shall provide all required top of masonry wall firestopping and smoke sealing as necessary to meet the requirements of the fire and smoke rated masonry assemblies as indicated in the Contract Documents.
- W. This Subcontractor shall rub, grind, clean and patch all exposed interior masonry. Prior to the Architect's review, this Subcontractor shall perform an interior masonry evaluation (pre-punch list) of their own work and repair all work not in accordance with the Contract Documents prior to final painting or as instructed by Construction Manager/ Architect.
- X. This Subcontractor shall provide the General Joint Sealant work associated with this work. All joint sealants required at joints, intersection, and transitions of materials installed under this bid package shall be provided by the Subcontractor.
- Y. This Subcontractor shall be responsible for caulking of joints between masonry and structural steel elements in exposed areas, including but not limited to caulking at steel columns & stair stringers adjacent to or within masonry construction.
- Z. This Subcontractor shall be responsible for installation of fire department knox box to be furnished by others.
- AA. This Subcontractor shall coordinate the location and placement of any required masonry hoist bearing beams.

BB. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #04

BID PACKAGE #05 – STRUCTURAL/ MISCELLANEOUS STEEL

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #05 – Structural / Miscellaneous Steel

The work of this #05 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 5 – Metals
05 12 00	Structural Steel Framing
05 31 00	Steel Decking
05 40 00	Cold-Formed Metal Framing
05 50 00	Metal Fabrications

	Division 5 – Metals (cont.)
05 51 13	Metal Pan Stairs
05 52 13	Pipe and Tube Railings
05 73 00	Decorative Metal Railings
	Division 32 – Exterior Improvements
32 31 19	Decorative Metal Fences and Gates

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.

- B. Subcontractor shall be responsible for construction layout relative to the performance of its own work and shall provide certified verification of the installations if requested by the CM.
- C. The Subcontractor shall be responsible for all fabrication, erection, handling, and delivery to the jobsite.
- D. This Subcontractor shall provide the complete structural steel system and miscellaneous steel, including but not limited to all beams and columns, steel joists, trusses, metal decking, roof and floor opening framing, hoisting beams, bridge structural framing, joist bridging, joist reinforcing, perimeter deck support angles, tube steel, channels, pour stop angles, bent plates, plates, masonry relief angles, masonry wall bracing, roof framing, elevator pit ladder, interior and exterior roof ladders, stairs, interior/exterior railings, and interior/exterior handrails
- E. This Subcontractor shall provide all necessary steel required for additional brick support angles all locations.
- F. This Subcontractor shall provide and install necessary materials required for interior 2nd floor steel cable railing system, including stainless steel curb cover.
- G. This Subcontractor shall furnish all embedded items including but not limited to all anchor bolts, setting plates, bearing plates and steel lintels as indicated on the Contract Documents. These items will be installed by other Subcontractors. Lintels/embeds not shown on the structural plans but required by the structural notes (i.e., lintels for MEP openings) shall be furnished by this subcontractor.
- H. This Subcontractor shall provide all miscellaneous steel indicated on the Contract Documents, including any miscellaneous steel indicated on the Architectural drawings but not on the Structural drawings.
- I. This Subcontractor shall furnish all pipe bollards for installation by others.
- J. This Subcontractor shall furnish all exterior gates at the dumpster enclosure, Dock Street, and the generator and transformer enclosures. The installation of these will be by others.
- K. This Subcontractor is responsible for coordinating all roof and floor opening locations with the trade requiring the opening.
- L. This Subcontractor shall provide all field connections as required for a complete installation.
- M. This Subcontractor shall be responsible for removal of all mud, dirt, debris and footprints from all structural members, joist and deck installed as part of this Bid Package.
- N. This Subcontractor shall be responsible for coordinating joist bridging locations and configurations with HVAC Subcontractor to allow for ductwork to be installed between joists if required.
- O. This Subcontractor shall be responsible for coordinating the location of perimeter deck edge angles with the Metal Stud and Drywall Subcontractor for proper alignment and attachment of metal stud framing.
- P. This Subcontractor shall provide shop priming, painting, and galvanizing in accordance with the Contract Documents and shall be responsible for field touch-up of all coatings affected by the erection process, including touch up of metal deck welds.
- Q. This Subcontractor shall provide certified welders as necessary and as indicated in the Contract Documents for all work associated with this Subcontract.

- R. This Subcontractor shall provide and maintain all perimeter cable fall protection at each floor level once metal deck is installed allowing safe access for subsequent Subcontractors. This Subcontractor shall coordinate start & stop points of perimeter cable with Construction Manager to allow for material hoisting areas. The framing Subcontractor shall be responsible for removal of perimeter cable fall protection as directed by the Construction Manager.
- S. This subcontractor shall be responsible for any delegated design as indicated in the Contract Documents and shall provide professionally engineered drawings and calculations as required by the Contract Documents.
- T. This Subcontractor shall install pre-case stair, tread / risers at monumental stair furnished by General Trades. Note: See General Trades Bid Package #06
- U. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #05

BID PACKAGE #06 – GENERAL TRADES

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #06 – GENERAL TRADES

The work of this #06 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 2 – Existing Conditions
02 41 19	Selective Structure Demolition
	Division 3 – Concrete
03 48 00	Precast Concrete Specialties
	Division 6 – Wood and Plastics
06 10 53	Miscellaneous Rough Carpentry
06 16 00	Sheathing
	Division 7 – Thermal and Moisture Protection
07 84 43	Joint Firestopping
07 92 00	Joint Sealants
07 95 13.13	Interior Expansion Joint Cover Assemblies
07 95 13.16	Exterior Expansion Joint Cover Assemblies
	Division 8 – Doors and Windows
08 11 13	Hollow Metal Doors and Frames
08 14 16	Flush Wood Doors
08 31 13	Access Doors and Frames
08 36 13	Sectional Doors
08 71 00	Door Hardware
08 71 13	Automatic Door Operators
08 80 00	Glazing
08 91 19	Fixed Louvers

	Division 10 – Specialties
10 11 00	Visible Display Surfaces
10 14 19	Dimensional Letter Signage
10 14 23	Panel Signage
10 21 13.19	Plastic Toilet Compartments
10 26 00	Wall Protection
10 28 00	Toilet, Bath, and Laundry Accessories
10 44 13	Fire Protection Cabinets
10 44 16	Fire Extinguishers
10 51 13	Metal Lockers
	Division 11 – Equipment
11 61 00	Laboratory Fume Hoods
	Division 12 – Furnishings
12 35 53	Laboratory Casework

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall be responsible for construction layout relative to the performance of its own work and shall provide certified verification of the installations if requested by the CM.
- C. This Subcontractor is responsible for providing all rough carpentry work as indicated in the Contract Documents.
- D. This Subcontractor shall furnish all project dumpsters and recycling dumpsters for trash, metal, and paper for the project duration including all required LEED documents.
- E. This Subcontractor shall provide all exterior wood blocking and plywood sheathing and roof / parapet blocking as indicated on the Contract Documents.
- F. This Subcontractor shall provide all closed cell spray insulation at the exterior cantilevered area framing.
- G. This Subcontractor shall provide all window and storefront blocking as indicated on the Contract Documents.
- H. This Subcontractor shall provide all required in-wall blocking for all trades including but not limited to blocking for casework, toilet accessories, visual display boards, display cases, lockers, plumbing fixtures, projectors, and television monitors.
- I. This Subcontractor shall provide the general Joint Sealant work associated with this bid package work.
- J. This Subcontractor shall provide all interior and exterior expansion joint cover assemblies as indicated on the Contract Documents.
- K. This Subcontractor shall provide all hollow metal frames, hollow metal doors, flush wood doors, FRP faced doors, and door hardware.
- L. This Subcontractor shall provide all overhead sectional doors and coiling doors.
- M. This Subcontractor shall expedite submittals and delivery of hollow metal frames for installation in masonry walls as required to meet the project schedule.
- N. This Subcontractor is responsible for ensuring that hollow metal frames remain true, plumb, level and properly aligned as adjacent wall construction is completed. Frames in masonry walls shall be grouted by another Subcontractor. Frames in metal stud walls shall be grouted by this Subcontractor. This Subcontractor is responsible for providing pockets or block-outs in grouted frames as required to allow for proper attachment of door hardware.

- O. All door lights shall be field glazed by another Subcontractor. This Subcontractor shall furnish all required glazing stops for glazed doors and frames provided under this bid package. All hollow metal frames are furnished and installed by this bid package.
- P. This Subcontractor shall provide all components of the built-in display cases except lighting and glass. This includes but is not limited to all required wood framing, plastic laminate components, trackable surfaces wrapped with vinyl wall covering, shelving standards and brackets, and display systems.
- Q. This Subcontractor shall furnish door hardware for the aluminum doors to the glazing Subcontractor for installation.
- R. This Subcontractor shall furnish power supplies for electronic door hardware to the electrical Subcontractor for installation. This note shall supersede any other assignment of work scope in the drawings or specifications.
- S. This Subcontractor shall furnish ADA operator push buttons/plates to the electrical Subcontractor for installation.
- T. This Subcontractor shall provide all access doors shown on the Architectural Drawings.
- U. This Subcontractor shall provide all overhead coiling counter doors, overhead coiling doors, overhead coiling grilles, and fire shutters. Any miscellaneous steel not shown on the Contract Documents but required for a complete installation of these door assemblies shall be provided by this Subcontractor.
- V. This Subcontractor shall provide all visual display surfaces as indicated in the Contract Documents.
- W. The Subcontractor shall provide all corner guards as indicated in the Contract Documents.
- X. This Subcontractor shall provide all toilet, bath, and laundry accessories as indicated in the Contract Documents.
- Y. This Subcontractor shall provide all interior and exterior signage including parking signage as indicated in the Contract Documents.
- Z. This Subcontractor shall provide all metal lockers and bench seating as indicated in the Contract Documents.
- AA. This Subcontractor shall provide all fire extinguishers and fire extinguisher cabinets as indicated in the Contract Documents. This Subcontractor shall be responsible for providing fire extinguisher inspection services and tags as required to obtain Certificate of Occupancy.
- BB. This Subcontractor shall provide all interior finish carpentry, architectural woodwork, manufactured plastic-laminate-faced casework, plastic-laminate-clad countertops, solid surface and epoxy countertops, solid surface sills and lab casework as indicated in the Contract Documents. Please refer to alternates for locations of finish carpentry and base bid requirements.
- CC. This Subcontractor shall be responsible for caulking of casework, architectural woodwork, countertops, backsplashes, and side splashes to adjacent materials.
- DD. This Subcontractor shall coordinate with the plumbing and electrical Subcontractors to ensure correct placement of rough-in locations inside casework. This Subcontractor shall provide cut outs in casework as required by other trades.
- EE. This Subcontractor shall furnish fire department knock box for installation by the Masonry Subcontractor.

- FF. This Subcontractor shall furnish pre-cast stair, tread / risers at monumental stair.
- GG. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #06

BID PACKAGE #07 – METAL PANELS

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #07 – Metal Panels

The work of this #07 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:-

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 7 – Thermal and Moisture Protection
07 21 19	Foamed-In-Place Insulation
07 27 26	Fluid-Applied Membrane Air and Water-Resistive Barriers
07 21 00	Thermal Insulation
07 42 13.23	Metal Composite Material Wall Panels
07 84 43	Joint Firestopping
07 92 00	Joint Sealants

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for

the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.

- B. This Subcontractor shall be responsible for construction layout relative to the performance of its own work and shall provide certified verification of the installations if requested by the CM.
- C. This Subcontractor shall provide and install all fluid and membrane applied air and water-resistive air barriers on the entirety of the building envelope as indicated on the contract documents.
- D. This Subcontractor shall be responsible to coordinate with the Subcontractor to ensure proper installation of transitions and flashings of various exterior cladding systems.
- E. This Subcontractor shall be responsible for the installation of spray foam insulation to seal any through wall penetrations and shave off flush with the exterior face of the substrate prior to installation of any air barrier systems. The roof penetrations are not required for installation of spray foam by this subcontractor and will be by the roofing contractor.
- F. This subcontractor shall coordinate with the CM for any required special inspections required.
- G. This Subcontractor shall coordinate with the Manufacturer's Representative(s). With Manufacturer's Representative(s) in attendance, this Subcontractor will attend a pre-installation conference at the project site. At the pre-installation conference, and in the presence of the Construction Manager, the Subcontractor shall review the exterior envelope and metal panel installation application in its entirety and confirm that the details for the application meet the manufacturers' requirements for a fully warranted system as well as the designer's intent for a full water barrier. Any questions or concerns regarding intent of design should be surfaced by this contractor to the Architect, through the CM, with sufficient time to be answered prior to the pre-installation conference.
- H. This Subcontractor shall be responsible for any delegated design as indicated in the contract documents.
- I. This Subcontractor shall provide all flashing and sheet metal adjacent / integral to this scope of work.
- J. This Subcontractor shall provide all rain screen systems, sub framing, attachment clips, fasteners, and insulation as indicated in the Contract Documents and as required for complete, warranted systems.
- K. This Subcontractor shall provide all formed metal wall panels, metal composite material wall panels, metal soffit panels, and column covers including all trim pieces, closure pieces, and flashings as indicated in the Contract Documents and as required for complete, warranted systems.
- L. This Subcontractor shall provide the general Joint Sealant work associated with this work as indicated in the Contract Documents and as required for a complete, warranted installation, including joint sealants at transitions to dissimilar materials.
- M. This Subcontractor shall be responsible for the furnishing and installation of all exterior metal soffits.
- N. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #07

BID PACKAGE #08 – TERRACOTTA PANELS

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #08 – Terracotta Panels

The work of this #08 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 7 – Thermal and Moisture Protection
07 21 00	Thermal Insulation
07 42 43	Terracotta Wall Panels
07 84 43	Joint Firestopping
07 92 00	Joint Sealants

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.

- B. This Subcontractor shall be responsible for construction layout relative to the performance of its own work and shall provide certified verification of the installations if requested by the CM.
- C. This subcontractor shall coordinate with the CM for any required special inspections required.
- D. This Subcontractor shall coordinate with the Manufacturer's Representative(s). With Manufacturer's Representative(s) in attendance, this Subcontractor will attend a pre-installation conference at the project site. At the pre-installation conference, and in the presence of the Construction Manager, the Subcontractor shall review the terracotta panel installation application in its entirety and confirm that the details for the application meet the manufacturers' requirements for a fully warranted system as well as the designer's intent. Any questions or concerns regarding intent of design should be surfaced by this contractor to the Architect, through the CM, with sufficient time to be answered prior to the pre-installation conference.
- E. This Subcontractor shall be responsible for any delegated design as indicated in the contract documents.
- F. This Subcontractor shall provide all flashing integral to this scope of work.
- G. This Subcontractor shall provide all rain screen systems, sub framing, attachment clips, fasteners, and insulation as indicated in the Contract Documents and as required for complete, warranted systems.
- H. This Subcontractor shall provide all required terracotta wall panels, associated sub framing systems outboard of the exterior substrate, fasteners, trim pieces, closure pieces, and flashings as indicated in the Contract Documents and as required for complete, warranted systems. This contractor provides and coordinates any required installation of any in wall framing required for the installation of the terracotta panel system. The installation of this in wall blocking will be installed by the framing subcontractor.
- I. This Subcontractor shall provide the general Joint Sealant work associated with this work as indicated in the Contract Documents and as required for a complete, warranted installation, including joint sealants at transitions to dissimilar materials.
- J. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #08

BID PACKAGE #09 – ROOFING

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #09 – Roofing

The work of this #09 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 7 – Thermal and Moisture Protection
07 21 00	Thermal Insulation
07 53 23	EPDM Roofing

	Division 7 – Thermal and Moisture Protection (cont.)
07 62 00	Sheet Metal Flashing and Trim
07 71 00	Roof Specialties
07 72 00	Roof Accessories

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.

- B. This Subcontractor shall be responsible for construction layout relative to the performance of its own work and shall provide certified verification of the installations if requested by the CM.
- C. This Subcontractor shall be responsible to coordinate with Subcontractors to ensure proper installation of transitions from exterior claddings systems to the roofing systems.
- D. This Subcontractor shall provide all roofing, roof accessories, trims, flashing sleeves, manufactured roof specialties, roof expansion joints, vent flashings, walkway pads, roof hatches, splash blocks and smoke vents, as indicated in the Contract Documents.
- E. This Subcontractor shall coordinate with the Roofing System Manufacturer's Representative(s). With Manufacturer's Representative(s) in attendance, this Subcontractor will attend a pre-installation conference at the project site. At the pre-installation conference, and in the presence of the Construction Manager, the Subcontractor shall review the roofing system application in its entirety and confirm that the details for the application meet the manufacturers' requirements for a fully warranted system as well as the designer's intent. Any questions or concerns regarding intent of design should be surfaced by this contractor to the Architect, through the CM, with sufficient time to be answered prior to the pre-installation conference.
- F. This Subcontractor shall be responsible for coordinating the installation of roof openings, penetrations, mechanical sleeves, curbs, drains, vents, and other similar items affecting the finished roof system and as required for the Work. Furnishing and installation of all items as noted shall be by the appropriate Subcontractor requiring the same. Shop drawings, installation details, and layout of all items above shall also be supplied by that Subcontractor. This Subcontractor shall be responsible to flash and/or seal all items above. This Subcontractor shall be responsible to provide the required hole covers as necessary to comply with OSHA requirements.
- G. This Subcontractor shall coordinate with the Mason Subcontractor and shall be responsible for furnishing all embedded inserts and regrets for installation by the Mason Subcontractor as required for a complete roofing system.
- H. This Subcontractor shall review the locations and installation of through wall masonry flashing at or above the roof lines, coordinating with Subcontractors to ensure that all reglets and roof flashings are installed below the through wall flashing and that no exterior or cavity moisture is trapped by the roof installation.
- I. This Subcontractor shall provide all flashing and sheet metal coping adjacent / integral to his work.
- J. This Subcontractor shall provide and install all protection board (at all metal decking areas including skybridge roof and vestibule roof), vapor/air barrier, insulation, and roofing membrane associated with this work as indicated in the Contract Documents and as required for a complete, warranted installation, including joint sealants at transitions to dissimilar materials. The exterior gypsum board located at the back of parapet and at exterior walls is by others.
- K. This Subcontractor will flash all roof curbs furnished and installed by others. This includes coordination with the other trades to make sure that the curbs extend above the roofline far enough to maintain the roofing warranty requirements.
- L. This Subcontractor shall provide the general Joint Sealant work associated with this work as indicated in the Contract Documents and as required for a complete, warranted installation, including joint sealants at transitions to dissimilar materials.
- M. This subcontractor shall install sound absorbing insulation for acoustic roof deck assemblies furnished by the steel subcontractor per Contract Documents.
- N. This Subcontractor shall be responsible for the furnishing and installation of all exterior metal soffits.

- O. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #09

BID PACKAGE #10 – EXTERIOR & INTERIOR FRAMING/ DRYWALL/ INTERIORS

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #10 – Exterior & Interior Framing/ Drywall/ Interiors

The work of this #10 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 6 – Wood and Plastics
06 16 00	Sheathing
06 40 23	Interior Architectural Woodwork
06 64 00	Plastic Paneling
	Division 7 – Thermal and Moisture Protection
07 21 00	Thermal Insulation
07 84 13	Penetration Firestopping

	Division 9 - Finishes
09 21 16.23	Gypsum Board Shaft Wall Assemblies
09 22 16	Non-Structural Metal Framing
09 29 00	Gypsum Board
09 51 13	Acoustical Panel Ceilings
09 51 33	Acoustical Metal Pan Ceilings

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall provide all exterior gypsum sheath framing. Exterior gypsum sheathing over metal decking is by roofer.
- C. This Subcontractor shall provide shop drawings for light gauge framing systems including required delegated design information.
- D. This Subcontractor shall be responsible for coordinating with the subcontractor to ensure the proper location of structural steel deck edge angles for attachment of exterior metal stud framing systems.
- E. This Subcontractor shall provide all interior metal stud, insulation, interior spray foam insulation and gypsum board work as indicated in the Contract Documents. In wall provided by Terracotta Sub (Bid Package #08). Any in-wall blocking will be provided by the Terracotta Sub and included in this bid package.
- F. This Subcontractor shall provide all thermal, acoustic and fire resistive insulation contained within metal stud and drywall systems including top of walls, soffits, and ceiling grid systems.
- G. This Subcontractor shall provide all required top of wall firestopping and smoke sealing as necessary to meet the requirements of the fire and smoke rated drywall assemblies as indicated in the Contract Documents.
- H. This Subcontractor shall provide all required acoustical sealants as necessary to meet the requirements of the STC rated drywall assemblies as indicated in the Contract Documents.
- I. This Subcontractor shall provide all required fire, smoke, and acoustical sealant at wall penetrations made by items that were installed prior to drywall installation. Sealing of penetrations made after drywall installation shall be the responsibility of the Subcontractor making the penetration.
- J. This Subcontractor shall be responsible for caulking of drywall assemblies to adjacent masonry construction or other dissimilar material (interior or exterior) at exposed conditions.
- K. This Subcontractor is responsible for providing all rough openings in metal stud and drywall construction as required for all trades.
- L. This Subcontractor is responsible for all drywall taping and finishing work in accordance with the Contract Documents including all required reveals, expansion joints, corner beads, and edge beads.
- M. This Subcontractor shall provide all acoustical panel, drywall, and other ceilings as indicated on the Contract Documents.
- N. This Subcontractor shall be responsible for delivery of an appropriate quantity of acoustical ceiling tile as requested by the Construction Manager for the purpose of facilitating installation of can lights, fire alarm devices, technology devices, and other ceiling mounted devices.

- O. This Subcontractor shall provide all spray insulation and sound absorbing wall / ceiling units as indicated in the Contract Documents.
- P. This Subcontractor shall be responsible for removal of all temporary perimeter safety cable and posts installed by the Subcontractor. Safety cable posts shall be ground flush with the concrete slab-on-deck. In addition, this Subcontractor shall provide, maintain, and remove a horizontal temporary safety rail at mid-height of all exterior window openings at elevated deck areas.
- Q. This subcontractor shall provide metal stud framing and sheathing for exterior wall mock-up.
- R. This Subcontractor shall provide all temporary opening enclosures as indicated in the temporary facilities specifications.
- S. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #10

BID PACKAGE #11 – GLASS & GLAZING

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #11 – Glass & Glazing

The work of this #11 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 7 – Thermal and Moisture Protection
07 84 43	Joint Firestopping
07 92 00	Joint Sealants

	Division 8 – Doors and Windows
08 41 13	Aluminum-Framed Entrances and Storefronts
08 44 13	Glazed Aluminum Curtain Walls

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall provide all exterior and interior aluminum-framed entrances, storefronts, curtain walls and aluminum windows including all sills, drip edges, and jamb extension pieces required for a complete installation.

- C. This Subcontractor shall provide and be responsible for all required delegated designs and engineering required by the contract documents for a complete warranted installation. This Subcontractor shall provide any structural steel not shown on the Contract Documents but required to complete the work of this bid package.
- D. This Subcontractor shall provide any wood blocking not shown on the Contract Documents but required to complete the work of this bid package.
- E. This Subcontractor shall coordinate and prep all aluminum door frames to accommodate all hardware and security equipment. Provide pathways through the framing systems/doors to accommodate power and control wiring for the operating devices.
- F. This Subcontractor shall coordinate and install all door hardware on aluminum door openings. Door Hardware shall be furnished by general trades Subcontractor.
- G. This Subcontractor shall furnish and install all glass and glazing, both at exterior and interior doors, half, and full vision, borrowed and side lights. This includes all vision lights in hollow metal and wood doors.
- H. This Subcontractor shall provide and install the glazing work for the built-in display cases including fixed glass, lockable sliding glass doors, and glass shelves.
- I. This Subcontractor shall provide the General Joint Sealant work associated with this work as indicated in the Contract Documents and as required for a complete, warranted installation, including joint sealants at transitions to dissimilar materials.
- J. This Subcontractor shall provide all final cleaning of glass and framing, including removal of packaging, stickers, and non-code required labels.
- K. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #11

BID PACKAGE #12 – TILE

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #12 – Tile

The work of this #12 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 9 – Finishes
09 10 01	Floor Preparation
09 30 13	Ceramic Tiling

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall provide all floor substrate and preparation work as necessary to complete the work of this bid package and provide all required warranties including filling and leveling around floor boxes, routing, and filling of concrete floor cracks, and installation of crack control membranes. This Subcontractor shall be responsible for any grinding and leveling work required due to the concrete slab

curing, shrinking, and curling; including grinding required due to curling at perimeter walls and saw cuts.

- C. This Subcontractor shall provide all ceramic tile flooring, base, and accessories as indicated in the Contract Document. Including porcelain tile, glazed wall tile, waterproof and crack isolation membranes, and metal edge strips.
- D. This subcontractor shall be responsible for any required concrete moisture emissions testing and documentation as required by the contract documents and in accordance with the manufacturer's requirements.
- E. This Subcontractor shall provide all joint sealants for the work of this bid package as indicated in the Contract Documents and as required for a complete installation, including joint sealants where resilient flooring meets stairs, steps, and hollow metal door frames.
- F. This Subcontractor shall be responsible for providing and removing ram board type floor protection at all areas after installation of finish flooring.
- G. This Subcontractor shall be responsible for all transitions between different flooring materials as shown on the contract drawings or recommended by the manufacturer.
- H. Tile backer board is by the framing subcontractor.
- I. This Subcontractor shall refer to Specification Section Allowances for allowances to be included in this bid package.
- J. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #12

BID PACKAGE #13 – FLOORING

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #13 – Flooring

The work of this #13 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 9 – Finishes
09 10 01	Floor Preparation
09 64 00	Wood Flooring

	Division 9 – Finishes (Cont.)
09 65 13	Resilient Base and Accessories
09 65 19	Resilient Tile Flooring
09 68 13	Tile Carpeting

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall provide all floor substrate and preparation work as necessary to complete the work of this bid package and provide all required warranties including filling & leveling around floor boxes, routing and filling of concrete floor cracks, and installation of crack control membranes. This Subcontractor shall be responsible for any grinding and leveling work required due to the concrete slab

curing, shrinking, and curling; including grinding required due to curling at perimeter walls and saw cuts.

- C. This Subcontractor shall perform require flooring substrate testing to ensure a complete warranted installation per as indicated in the Contract Documents.
- D. This Subcontractor shall provide all resilient sheet and flooring, base, and accessories as indicated in the Contract Document.
- E. This Subcontractor shall provide all wood flooring and base as indicated in the Contract Documents and alternates.
- F. This Subcontractor shall provide all tile carpeting as indicated in the Contract Documents.
- G. This Subcontractor shall provide all joint sealants for the work of this bid package as indicated in the Contract Documents and as required for a complete installation, including joint sealants where resilient flooring meets stairs, steps, and hollow metal door frames.
- H. This Subcontractor shall be responsible for providing and removing ram board type floor protection (minimum 6' wide) at all corridors after installation of finish flooring.
- I. This Subcontractor shall be responsible for all transitions between different flooring materials as shown on the contract drawings or recommended by the manufacturer.
- J. This Subcontractor shall refer to Specification Section Allowances for allowances to be included in this bid package.
- K. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #13

BID PACKAGE #14 – PAINTING

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, all published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #14 – Painting

The work of this #14 Bid Package shall include, but not be limited to the following Specification Sections:

- A. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- B. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 9 – Finishes
09 91 13	Exterior Painting
09 91 23	Interior Painting

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall provide all interior and exterior painting as indicated in the Contract Documents and in general includes gypsum board surfaces; masonry surfaces; concrete surfaces;

exposed structure ceilings; exposed conduit & junction boxes, piping, ductwork, insulation, and miscellaneous metals; hollow metal doors & frames and access panels. Include elevator pit area.

- C. This Subcontractor shall be responsible for all-natural gas piping painting as required by the Contract Documents.
- D. This Subcontractor shall be responsible for surface preparation and touch up priming of metal surfaces prior to application of finish paint.
- E. This Subcontractor shall provide all necessary protection and surface preparation as required to ensure quality installations.
- F. This Subcontractor shall be responsible for minor drywall repairs prior to application of finish paint.
- G. This Subcontractor shall be responsible for masking all items that are not to be painted including but not limited to valves, equipment labels, cables, and door & frame UL labels.
- H. This Subcontractor shall provide all fire & smoke barrier identification stenciling as indicated by the Contract Documents.
- I. This Subcontractor shall be responsible for caulking of all interior hollow metal frames to adjacent wall surfaces. This includes the interior side of exterior hollow metal frames and includes caulking of frames in areas not shown to receive a painted wall finish.
- J. This Subcontractor shall be responsible for the caulking between the interior sectional garage door frames and the adjacent drywall.
- K. This Subcontractor shall provide all concrete sealer as indicated in the Contract Documents.
- L. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #14

BID PACKAGE #15 – POLISHED CONCRETE

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #15 – Polished Concrete

The work of this #15 Bid Package shall include, but not be limited to the following Specification Sections:

- B. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- C. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 3 – Concrete
03 35 43	Polished Concrete Finishing

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall provide all floor substrate & preparation work as necessary to complete the work of this bid package and provide all required warranties including filling & leveling around floor boxes, routing & filling of concrete floor cracks, and installation of crack control membranes. This Subcontractor shall be responsible for any grinding & leveling work required due to the concrete slab curing, shrinking, & curling; including grinding required due to curling at perimeter walls and saw cuts.

- C. This Subcontractor shall be responsible for the polished concrete as shown on the contract documents.
- D. This Subcontractor shall provide all joint sealants and stains for the work of this bid package as indicated in the Contract Documents and as required for a complete installation, including joint sealants where resilient flooring meets stairs, steps, and hollow metal door frames.
- E. This Subcontractor shall be responsible for providing and removing ram board type floor protection at all polished concrete installation locations after finish of flooring.
- F. This Subcontractor shall be responsible for any and all transitions between different flooring materials as shown on the contract drawings or recommended by the manufacturer.
- G. This Subcontractor shall refer to Specification Section Allowances for allowances to be included in this bid package.
- H. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #15

BID PACKAGE #16 – ELEVATORS

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #16 - Elevators

The work of this #16 Bid Package shall include, but not be limited to the following Specification Sections:

- B. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- C. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 14 – Conveying Systems
14 21 23.16	Machine Room-Less Electric Traction Passenger Elevators

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall be responsible to provide detailed requirements for the pit and shaft sizes, dimensions, and special requirements within fourteen (14) days of the award of subcontract.

- C. This Subcontractor shall furnish and install the Elevators in accordance with the related sections of Division 14 of the Specifications as indicated in the Contract Documents.
- D. This Subcontractor shall coordinate with the masonry Subcontractor for an acceptable location for the elevator hoist beam and pit ladder. The steel Subcontractor shall provide the elevator hoist beam and pit ladder.
- E. This Subcontractor shall be responsible to provide any steel angles for hoist way doors sill support that may be required.
- F. This Subcontractor shall be responsible for field measurements of the elevator pit and shaft prior to commencing fabrication.
- G. This Subcontractor shall be responsible for field verification of elevator pit, shaft, and machine room conditions prior to commencing installation.
- H. This Subcontractor shall coordinate delivery and storage of the elevator components with the Construction Manager.
- I. This Subcontractor shall be responsible for elevator shaft fall protection measures from the start of elevator installation to completion of installation.
- J. This Subcontractor shall be responsible for firestopping of all penetrations through fire-rated walls required by the work of this bid package.
- K. This Subcontractor shall coordinate with the electrical Subcontractor to ensure proper connection of elevator to the building fire alarm system as required by local codes and Authority Having Jurisdiction.
- L. This Subcontractor shall include costs in its bid to pre-test the elevator system with the fire alarm contractor prior to inspection by the Authority Having Jurisdiction.
- M. The Subcontractor shall secure and pay for all permits, certifications, and testing of the Elevator as required by the Contract Documents, and inspections required by the State of Ohio and other
- N. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #16

BID PACKAGE #17 – FIRE PROTECTION - SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #17 – Fire Protection

The work of this #17 Bid Package shall include, but not be limited to the following Specification Sections:

- B. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- C. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 21 – Fire Suppression
21 00 10	Document Interpretation and General Requirements
21 01 10	Project Submittal Requirements
21 01 30	Coordination Drawings
21 02 10	Owner Operating and Maintenance Training
21 03 10	System and Component Flushing and Testing
21 03 20	Fire Pump Testing
21 04 20	Painting
21 04 40	Equipment Pads
21 05 10	Electrical Requirements for Fire Protection Equipment
21 07 10	Penetrations and Sleeves
21 07 20	Firestopping
21 09 10	Hydraulic Design Requirements
21 10 10	Common Piping Requirements
21 10 20	Wet-Pipe System Piping

	Division 21 – Fire Suppression (cont.)
21 10 30	Water Service Piping
21 12 10	Piping Identification
21 12 20	Piping Hangers and Supports
21 12 30	Pressure Gauges
21 12 40	Fire Pump Test Headers
21 13 10	Fire Protection Valves
21 13 40	Suction Control Valves
21 20 10	Equipment Identification
21 21 10	Electric Horizontal Spit Case Fire Pumps
21 21 20	Electric Vertical Multi-Stage Jockey Pumps
21 22 10	Double Detector Check Backflow Preventers
21 25 20	Fire Department Siamese Connections
21 31 10	Sprinkler Heads
21 32 10	Flow and Tamper Switches

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This subcontractor shall provide a complete fire Protection system as indicated in the Contract Documents and in accordance with all applicable codes.
- C. This Subcontractor shall be responsible for coordinating the installation of their work with that of other MEP Subcontractors (Reference 01 31 13). This Subcontractor will provide information concerning routing of the fire protection piping and sprinklers to all MEP Subcontractors to assist in producing a Master Coordination Drawing for the Project. The Fire Protection Subcontractor shall similarly coordinate required openings and penetrations with all other Subcontractors. The Master Coordination Drawing shall also at the conclusion of the Project be circulated to all Subcontractors for incorporation of As-built conditions.
- D. The Fire pump / ATS controller to be furnished by the Owner and installed by the contractor. The jockey pump will be furnished and installed by the Fire Protection Subcontractor.
- E. This Subcontractor shall furnish any structural steel lintels needed for fire protection wall penetrations, but not shown on the Contract Drawing structural floor plans. All costs associated with steel lintels not identified and furnished by this Subcontractor in a timely manner to meet the project schedule shall become the responsibility of this subcontractor.
- F. This Subcontractor shall furnish all wall and floor sleeves required by the work of this bid package for installation by others.
- G. This Subcontractor shall caulk and/or seal all penetrations through walls, roofs, or ceilings resulting from the installation of the Fire Protection/Sprinkler Piping and Equipment. This Subcontractor shall provide fire stopping where required per drawing, specification, or by code.
- H. This Subcontractor shall provide Identification of Penetration Fire Stopping as required by the Contract Documents and Authorities having Jurisdiction.
- I. This Subcontractor shall provide phased hydrostatic testing of the Fire Protection system in accordance with the project schedule. This includes isolation and testing of piping above gypsum board ceilings and soffits as required.
- J. This Subcontractor is responsible for permit and inspection costs for all testing, inspections, licenses required by the Authority Having Jurisdiction as required to gain an occupancy permit.
- K. This Subcontractor shall be responsible to coordinate with the Sitework Subcontractor to ensure the proper location, height, and orientation of the flanged water line for this contractor to correctly build the riser assembly. The Sitework Subcontractor shall provide the site fire protection & FDC lines to flanged connections points inside mechanical room
- L. This Subcontractor shall furnish and install all access panels shown on the Fire Protection Drawings or not otherwise shown on the Contract Drawings but required by the work of this bid package.

- M. This Subcontractor shall provide all concrete housekeeping pads required for equipment installed under this bid package and shall utilize qualified tradesmen skilled in this work.
- N. This Subcontractor shall provide fire protection cabinets for fire department valves and racks as indicated in the Contract Documents and as required by the Authority Having Jurisdiction.
- O. This Subcontractor shall be responsible for all fire protection plan review, permit, and inspection fees required by Authorities Having Jurisdiction.
- P. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #17

BID PACKAGE #18 – PLUMBING

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #18 – Plumbing

The work of this #18 Bid Package shall include, but not be limited to the following Specification Sections:

- B. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- C. The following Specification Sections are particularly pertinent to this Bid Package and the below list is NOT a complete itemized scope of work for this bid package but a guide for the plumbing scope of work for all products and procedures as described in each specification Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 22 - Plumbing
22 00 10	Document Interpretation and General Requirements
22 00 90	LEED Requirements
22 01 10	Project Submittal Requirements
22 01 30	Coordination Drawings
22 02 10	Owner Operating and Maintenance Training
22 03 10	Piping Systems Flushing and Testing
22 03 20	Equipment and System Start-Up
22 03 50	Commissioning of Plumbing Systems and Components
22 04 20	Painting
22 04 30	Excavation, Trenching, Backfilling, and Paving
22 04 40	Equipment Pads
22 05 10	Electrical Requirements for Plumbing Equipment
22 05 20	Variable Frequency Drives
22 07 10	Penetrations and Sleeves
22 07 20	Firestopping
22 07 30	Roof Curbs
22 07 40	Miscellaneous Steel Supports
22 08 10	Vibration Isolation
22 10 10	Common Piping Requirements
22 10 20	Drain, Waste and Vent Piping
22 10 30	Domestic Water Piping
22 10 31	Water Service Piping
22 10 40	Natural Gas Piping
22 10 51	Laboratory Air, Gas and Vacuum Piping
22 10 60	Acid Waste and Vent Piping
22 10 80	Compressed Air Piping
22 10 90	Flue and Vent Piping
22 11 10	Piping Insulation
22 12 10	Piping Identification
22 12 20	Piping Hangers and Supports
22 12 30	Thermometers and Gauges
22 12 40	Flexible Pipe Connectors
22 12 50	Water Hammer Arrestors

	Division 22 – Plumbing (cont.)
22 12 60	Cleanouts
22 13 10	Domestic Water Valves
22 13 11	Domestic Water Mixing Valves
22 13 20	Natural Gas Valves
22 13 21	Natural Gas Pressure Regulators
22 13 31	Laboratory Air, Gas and Vacuum Valves
22 13 40	Compressed Air Valves
22 14 10	Reduced Pressure Backflow Preventers
22 14 20	Dual Check Backflow Preventers
22 17 30	Strainers
22 18 11	Bladder Type Expansion Tanks
22 19 10	Water Flow Sub-Meters
22 19 40	Natural Gas Sub-Meters
22 20 10	Equipment Identification
22 20 20	Equipment Insulation
22 21 11	High Efficiency Gas-Fired Water Heaters
22 24 11	Skid Mounted Domestic Booster Pumps
22 24 20	Recirculation Pumps
22 24 34	Hydraulic Elevator Pit Sump Pumps
22 27 10	Laboratory Air Compressors (Not Issued)
22 27 20	Laboratory Vacuum Pumps (Not Issued)
22 30 40	Acid Waste Sumps
22 40 11	Water Closets
22 40 12	Urinals
22 40 14	Lavatories
22 40 20	Stainless Steel Sinks
22 40 30	Laundry Sinks
22 40 32	Mop Basins (Terrazzo)
22 40 43	Gas Turrets
22 40 50	Electric Water Coolers
22 40 90	Emergency Fixtures
22 41 10	Drains and Trap Primers
22 42 10	Hose Bibbs

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall be responsible for construction layout relative to the performance of its own work and shall provide certified verification of the installations if requested by the CM.
- C. This Subcontractor shall be responsible for the installation of the following owner provided equipment: lab vacuum pump, lab air compressor, and the high efficiency water heaters. All associated materials for connected and startup for a complete warranted installation is by the plumbing subcontractor.
- D. This Subcontractor shall provide a complete and functional Plumbing System in accordance with the Contract Documents and all applicable codes.
- E. This Subcontractor shall be responsible for coordinating the installation of his work with that of other MEP Subcontractors (Reference 01 31 13). This Subcontractor will provide information concerning location and routing of piping and/or equipment installed under this bid package to the HVAC Subcontractor to assist in producing a Master Coordination Drawing for the Project. The Plumbing Subcontractor shall similarly coordinate required openings and penetrations with all other Subcontractors. The Master Coordination Drawing shall also at the conclusion of the Project be circulated to all Subcontractors for incorporation of As-built conditions.
- F. This Subcontractor shall furnish any structural steel lintels needed for plumbing wall penetrations, but not shown on the Contract Drawing structural floor plans. All costs associated with steel lintels not identified and furnished by this Subcontractor in a timely manner to meet the project schedule shall become the responsibility of this subcontractor.
- G. This Subcontractor shall be responsible for the installation of plumbing sleeves, curbs, drains, vents, and other similar items affecting the finished roof system and as required for the Work. Subcontractor shall coordinate with the roofing Subcontractor relative to location and schedule and shall participate in assuring that the penetrations are weather tight. The roofing Subcontractor shall be responsible to flash and/or seal all items above.
- H. After the completion of roof installation in each area, this Subcontractor shall be responsible for all temporary measures required to direct storm water to the exterior of the building until the permanent storm piping can be installed.
- I. This Subcontractor shall caulk and/or seal all penetrations through walls, roofs, or ceilings resulting from the installation of the piping and equipment under this bid package. Subcontractor shall provide fire stopping where required per drawing, specification, or by code.
- J. This Subcontractor shall provide Identification of Penetration Fire Stopping as required by the Contract Documents and Authorities Having Jurisdiction.
- K. This Subcontractor shall be responsible for drainage and dewatering of the work under this Bid Package. Subcontractor shall use pumps and temporary ditching as necessary to remove water from the site and trenches per the SWPP plan.

- L. This Subcontractor shall provide its own site utility excavation, bedding and backfill for underground piping and/or utilities that it is responsible for installing. Piping work shall be installed in accordance with all applicable codes. Premium fill shall be utilized as approved by the Engineer when existing materials are not acceptable for any reason.
- M. This Subcontractor shall be responsible for off-site removal and legal disposal of excess soils generated by the work of this bid package as they are generated. Excess soils shall be removed from the site daily and shall not be allowed to accumulate onsite.
- N. This Subcontractor shall provide the building sanitary and storm sewer lines to 5 feet outside the building and provide connection to the site sewer systems.
- O. This Subcontractor shall be responsible to coordinate with the Sitework Subcontractor to ensure the proper location, height, and orientation of the flanged water line for this subcontractor to correctly build their riser assembly. The Sitework Subcontractor shall provide the site water lines to a flanged connection points inside the Mechanical Room.
- P. This Subcontractor shall provide connection of the mechanical make-up water system to the domestic water system including any required valves, strainers, and backflow preventers. The mechanical Subcontractor shall provide mechanical make-up water piping from this connection point to the mechanical equipment.
- Q. This Subcontractor shall provide all required intake and flue piping and/or ductwork for the domestic water heaters.
- R. This Subcontractor shall provide all-natural gas piping from connection to the gas utility company's meter set to final connections at all gas fired fixtures and equipment.
- S. This Subcontractor shall provide elevator sump pump and subsequent drainage as shown on Contract Documents. Power to sump pump to be coordinated with the electrical Subcontractor.
- T. This Subcontractor must be present on-site during pours when this Subcontractor's work is being covered and/or encased in concrete.
- U. This Subcontractor shall make plumbing connections for all equipment.
- V. This Subcontractor shall be responsible for all required pressure testing, flushing, and sterilization of piping systems installed under this bid package.
- W. This Subcontractor shall furnish all access panels shown or not shown on the Contract Drawings but required by the scope of work provided in this bid package.
- X. This Subcontractor shall assist the Commissioning Authority in all commissioning and startup activities related to the work of this bid package.
- Y. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #18

BID PACKAGE #19 – HVAC

SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK:

Bid Package #19 – HVAC

The work of this #19 Bid Package shall include, but not be limited to the following Specification Sections.

- B. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- C. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 23 – Heating, Ventilating and Air Conditioning
23 00 10	Document Interpretation and General Requirements
23 00 90	LEED Requirements
23 01 10	Project Submittal Requirements
23 01 30	Coordination Drawings
23 02 10	Owner Operating and Maintenance Training
23 03 10	Hydronic Piping Systems Flushing and Testing
23 03 20	Equipment and System Start-Up
23 03 30	Testing, Adjusting and Balancing
23 03 40	Ductwork Leakage Testing
23 03 50	Commissioning of Mechanical Systems and Components
23 04 20	Painting
23 04 40	Concrete Equipment Pads
23 05 10	Electrical Requirements for Mechanical Equipment
23 05 20	Variable Frequency Drives
23 07 10	Penetrations and Sleeves
23 07 11	Roof Penetration Curbs
23 07 20	Firestopping
23 07 30	Miscellaneous Steel and Supports
23 08 10	Vibration Isolation
23 10 10	Common Piping Requirements
23 10 20	Hydronic Piping
23 10 40	Refrigerant Piping
23 11 10	Piping Insulation
23 12 10	Piping Identification
23 12 20	Piping Hangers and Support
23 12 30	Thermometers and Gauges
23 12 40	Flexible Pipe Connectors
23 13 10	Hydronic Valves
23 13 40	Refrigerant Valves
23 14 10	Hydronic Manual Balance Valves
23 14 20	Hydronic Automatic Balance Valves
23 14 30	Hydronic Coil Piping Packages
23 15 10	Flow Measuring Devices – Venturi
23 16 10	Closed Loop Water Treatment Systems
23 17 10	Air Separators
23 17 30	Strainers
23 18 10	Bladder Type Expansion Tanks
23 20 10	Metal Ductwork

	Division 23 – Heating, Ventilating and Air Conditioning (cont.)
23 20 20	Flexible Ductwork
23 20 50	Breeching and Vents
23 21 10	External Ductwork Insulation
23 21 20	Internal Ductwork Liner
23 22 10	Grilles and Diffusers
23 22 20	Ductwork Access Doors
23 22 30	Manual Balance Dampers
23 22 35	Gravity Backdraft Dampers
23 22 40	Fire Dampers
23 23 10	Louvers
23 30 10	Equipment Identification
23 30 20	Equipment Insulation
23 33 52	Gas-Fired Stainless Steel Condensing Boilers
23 34 10	End Suction Pumps
23 50 11	Centrifugal Roof Exhaust Fans
23 50 13	In-line Centrifugal Fans
23 50 18	Ceiling Toilet Exhaust Fans
23 50 50	Propeller Fans
23 60 10	Packaged Rooftop Units
23 74 20	Series Fan Powered Terminal Boxes with Hydronic Heat
23 76 10	Hydronic Unit Heaters
23 76 40	Gas-Fired Unit Heaters
23 77 10	Hydronic Cabinet Unit Heaters
23 77 30	Electric Cabinet Unit Heaters
23 81 10	Ductless Split Air Conditioning Systems
23 90 10	Instrumentation and Control for HVAC
23 92 10	Wire and Cable
23 92 11	Conduit Systems
23 92 12	Pulling Cables
23 93 10	Control Devices
23 93 20	Electronic Control Valves and Actuators
23 93 30	Electronic Control Dampers and Actuators
23 93 50	Hydronic Energy Measurement Systems
23 93 60	Water Flow Meters (Not Issued)
23 93 62	Electric Meters (Not Issued)
23 93 63	Natural Gas Meters (Not Issued)
23 95 10	General Programming Requirements
23 99 10	Sequences of Operation

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall be responsible for construction layout relative to the performance of its own work and shall provide certified verification of the installations if requested by the CM.
- C. This Subcontractor shall provide a complete and functional HVAC System in accordance with the Contract Documents and all applicable codes, this Subcontractor shall install all owner furnished equipment including the following: gas fired condensing boilers, packaged RTU's, air cooled condensing units, ductless air conditioning units, and series fan powered VAV boxes. All associated materials for a complete installation will be provided by this subcontract.
- D. This Subcontractor shall install all owner provided instrumentation and Controls associated with the fully functioning HVAC system.
- E. The Electrical Subcontractor shall provide raceways and junction boxes required for in-wall rough-in of thermostats and sensors as indicated on the Contract Drawings. All other raceways and junction boxes required for the temperature controls system shall be provided by this Subcontractor, including any inwall rough-in that is required but not shown on the Contract Drawings.
- F. This Subcontractor shall have primary responsibility over the Construction IAQ Management plan, including development and implementation of this plan. This Subcontractor is responsible for sealing all openings in ductwork, both before installation and after, to avoid dust infiltration during construction. Should ductwork be compromised, this Subcontractor shall hire a cleaning company to properly remove contaminants from ductwork at no additional cost to the CM and/or Owner.
- G. This Subcontractor shall provide temporary filtration media from start-up of equipment until Contract Completion. This includes providing and maintaining temporary filters in air handling units, at ducted return air openings, and at all return air grille openings into plenum ceiling area.
- H. This Subcontractor shall be responsible for Indoor Air Quality testing prior to building occupancy as necessary to meet the requirements of LEED.
- I. This Subcontractor shall develop, expedite, coordinate, and submit for Design Team review a master coordination drawing/schedule of all MEP/FP Installations (Reference 01 31 13). This subcontractor is responsible for obtaining relevant information from other Subcontractors to include in this submittal. This Mechanical Coordination Drawing (or Drawings) shall as a minimum include Routing of Mechanical Piping and Ductwork, Mechanical Equipment, Fire Protection & Plumbing Piping, Conduits larger than 2" in diameter, Recessed Light Fixtures, and Cable Tray. Each line type and size to be identified. Drawing(s) shall also include miscellaneous and/or typical details and sections as may be needed to coordinate the work. A Preliminary version of the Coordination Drawing(s) shall be made available to the Architect/CM and all Subcontractors for their input within 45 days of Contract Award. Final Coordination Drawings shall be produced and available for distribution within 120 days from Contract Award. The Master Coordination Drawing shall also at the conclusion of the Project be circulated to all Subcontractors for incorporation of As-built conditions.

- J. This Subcontractor shall furnish any structural steel lintels and floor/roof frames needed for HVAC wall and floor/roof penetrations not shown on the Contract Drawing structural floor plans. All costs associated with steel lintels and roof frames not identified and furnished by this Subcontractor in a timely manner to meet the project schedule shall become the responsibility of this subcontractor.
- K. This Subcontractor shall be responsible for the installation of roof openings, penetrations, mechanical sleeves or boots, curbs, drains, vents, bird screens and other similar items affecting the finished roof system and as required for the Work. Subcontractor shall coordinate with the roofing Subcontractor relative to location and schedule and shall participate in assuring that any penetrations for the above items are weather tight. The roofing Subcontractor shall be responsible to flash and/or seal all items above.
- L. This Subcontractor shall caulk and/or seal all penetrations through walls, roofs, or ceilings resulting from the installation of the piping and equipment under this bid package. Subcontractor shall provide fire stopping where required per drawing, specification, or by code.
- M. This Subcontractor shall provide Identification of Penetration Fire Stopping as required by the Contract Documents and Authorities Having Jurisdiction.
- N. This Subcontractor shall furnish and install all flashing and sheet metal adjacent / integral to this scope of work.
- O. This Subcontractor shall caulk all expansion joints, flashing, and sheet metal installed under this bid package.
- P. This Subcontractor is for all flushing, purging, testing, and filling operations for all HVAC systems.
- Q. This Subcontractor is responsible to submit a flushing and purging procedure for all piping installed under this contract. Prior to commencing with these operations, the procedures must be approved by the engineer of record.
- R. This Subcontractor is responsible for all filtering and chemical water treatment required to meet HVAC equipment manufacturer's requirements for water quality.
- S. This Subcontractor shall provide mechanical make-up water piping from the connection point provided by the plumbing Subcontractor to the mechanical equipment.
- T. This Subcontractor shall furnish all motor starters and variable frequency drives required for equipment installed under this bid package not indicated as supplied by owner. Motor starters and variable frequency drives shall be installed and wired by the electrical Subcontractor.
- U. This Subcontractor shall check, test, startup, and adjust all systems and equipment furnished under this subcontract.
- V. This Subcontractor shall furnish and install all roof curbs, roof rails, roof penetration enclosures, rooftop equipment, ductwork, and hoods required for a complete and functional installation of the work not indicated as owner supplied.
- W. This Subcontractor shall provide startup of new units when required for heat, dehumidification, cooling, and ventilation as described by specification section 015000 Temporary Facilities.
- X. This Subcontractor shall assist the Commissioning Authority in all commissioning activities related to the work of this bid package.
- Y. This Subcontractor shall assist the Testing & Balancing contractor which is under direct contract with the Owner/Architect.

- Z. This Subcontractor shall furnish and install all access panels shown on the Mechanical Drawings or not otherwise shown on the Contract Drawings but required by the work of this bid package.
- AA. This Subcontractor shall install all duct detectors to be furnished and wired by the Electrical Subcontractor.
- BB. This Subcontractor shall provide the Fixed Louvers as indicated in the Contract Documents.
- CC. This Subcontractor shall be responsible for coordinating with the Electrical and General Trades subcontractor for the installation of the ventilation system required by the manufacturer for the laboratory fume hood.
- DD. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

END BID PACKAGE #19

BID PACKAGE #20 – ELECTRICAL - SUMMARY OF WORK

RELATED DOCUMENTS:

- A. All drawings and technical specifications, Notice to Bidders, Bid Form, Special Conditions, All published Addenda, Division 0 and 1 General Requirements, and all other documents as delineated by the Table of Contents.

DESCRIPTION OF WORK

Bid Package #20 – Electrical / Technology Systems & Communications

The work of this #20 Bid Package shall include, but not be limited to the following Specification Sections:

- B. Provide all labor, materials, equipment, tools, supplies, services, and perform all things necessary to complete all work in accordance with the Project Specifications, Drawings, and related documents to complete the intended scope without limitation as may be implied by the general description. Scope of work is to be completed to the Owner's satisfaction utilizing the best construction practices, either meeting or exceeding industry standards for quality workmanship.
- C. The following Specification Sections are particularly pertinent to this Bid Package, with all products and procedures as described in each Section, accompanied by the Division I General Requirements and Special Requirements as noted herein, and as required for completion of the Work:

03 31 32	Geotechnical Data
00 72 00	AIA Document A201
All specifications applicable to bid package	Division 1: General requirements
	Division 26 – Electrical
26 00 51	Basic Materials and Methods
26 00 52	Tests
26 00 53	General Wiring
26 00 54	Cutting and Patching
26 00 55	Temporary Power
26 00 56	Firestopping
26 00 60	Excavating, Trenching, Backfilling and Restoration
26 00 74	Electrical Demolition and Salvage
26 01 11	Conduit Systems
26 01 14	Cable Tray
26 01 20	Wire and Cable
26 01 25	Pulling Cables
26 01 40	Wiring Devices and Plates
26 01 51	Motor Wiring
26 01 52	Wiring of Equipment Furnished Under Other Divisions
26 01 54	Fractional Horsepower Motor Starters
26 01 55	Combination Motor Starters
26 01 62	Distribution Switchboards
26 01 64	Circuit Breaker Distribution Panelboards

	Division 16 – Electrical (cont.)
26 01 65	Branch Circuit Panelboards
26 01 70	Disconnect Switches
26 01 71	Surge Suppression
26 01 81	Fuses
26 02 16	Standby Power Generation
26 02 50	Automatic Transfer Switch
26 04 50	Grounding
26 04 61	Dry Type Distribution Transformers
26 05 01	Lighting
26 06 01	Lighting Protection Systems
26 09 16	Lighting Control System
26 09 32	Automatic Lighting Control
26 09 50	Electrical Bid Alternates
	Division 27 – Communications
27 00 51	Basic Materials and Methods
27 07 40	Communication Cabling and Equipment
27 07 70	Paging System
27 07 71	Classroom Sound System
27 07 82	Audio/Visual Systems
	Division 28 – Electric Safety and Security
28 00 51	Basic Materials and Methods
28 07 21	Fire Alarm and Detection System

SPECIAL REQUIREMENTS:

- A. This Subcontractor shall be responsible to provide a performance bond and payment bond in a form suitable to the Construction Manager. Each Surety under the Bond shall be licensed to do business in Ohio and satisfactory to the Construction Manager. If there is more than one Surety under a Bond, each of them shall be jointly and severally liable as surety under that Bond. The Bond cost shall be for the amount of the Base Bid plus all add Alternates. The Subcontractor shall submit with the executed Bond (1) a certified copy of the authority to act (power of attorney) of the agent signing the Bond on behalf of the Surety and (2) a current and signed Certificate of Compliance under ORC Section 9.311 issued by the Ohio Department of Insurance showing the Surety is licensed to do business in Ohio.
- B. This Subcontractor shall be responsible for construction layout relative to the performance of its own work and shall provide certified verification of the installations if requested by the CM.
- C. This Subcontractor and its Subcontractors shall be responsible to secure and pay fees for any special permits, inspections, licenses, or fees required by local Authorities Having Jurisdiction over the Project.
- D. This Subcontractor shall be available to meet and coordinate with The School District's private utility suppliers for cable TV, telephones, internet service, broadcasting service, etc. In addition to coordination, this Subcontractor shall be available for special coordination meetings as required and scheduled by private utility companies.
- E. This Subcontractors required to clean-up debris for all areas that are affected by the installation of this work. This Subcontractor shall be responsible for repairs to the work of others damaged because of this work and/or traffic.
- F. This Subcontractor shall provide a complete and functional Electrical System in accordance with the Contract Documents and all applicable codes.
- G. This Subcontractor shall provide a complete and functional Fire Alarm System in accordance with the Contract Documents and all applicable codes.
- H. This Subcontractor shall provide all rough-in and wiring for communications and electronic safety and security cabling as indicated in the Contract Documents, including all conduits, raceways, 'J' hooks, cable tray, junction boxes, floor boxes, and wall sleeves.
- I. This Subcontractor shall provide all Data Network Wiring, Patch Cords, VOIP Telephone System, Public Address Systems, Central Sound and Paging System, Clock System, Access Control System, and Video Surveillance. This subcontractor will furnish and install all communications cabling from existing High School 4th floor IT room to new STEM IT Room, all wiring, cable tray and cable management from termination box back to IT room. The owner will provide IT racks, patch panels, and cable management inside the IT room. IT termination plates will be provided by owner. This subcontractor will be responsible for a complete install of all owner supplied items.
- J. This Subcontractor shall provide raceways and junction boxes required for in-wall rough-in of HVAC thermostats and sensors as indicated on the Contract Drawings. All other raceways and junction boxes required for the HVAC system shall be provided by the HVAC Subcontractor, including any in-wall rough-in that is required but not shown on the Contract Drawings.
- K. This Subcontractor shall be responsible for coordinating the installation of his work with that of other MEP Subcontractors. This Subcontractor will provide information concerning location and

routing of conduits, raceways, cable trays and equipment installed under this bid package to the HVAC Subcontractor to assist in producing a Master Coordination Drawing for the Project. The Electrical Subcontractor shall similarly coordinate required openings and penetrations with all other Subcontractors. The Master Coordination Drawing shall also at the conclusion of the Project be circulated to all Subcontractors for incorporation of As-built conditions.

- L. This Subcontractor shall furnish any structural steel lintels needed for electrical wall penetrations, not shown on the Contract Drawing structural floor plans. All costs associated with steel lintels not identified and furnished by this Subcontractor in a timely manner to meet the project schedule, shall become the responsibility of this subcontractor.
- M. This Subcontractor shall be responsible for the installation of conduits, cables, clamps, sleeves, boots, or other similar items affecting the finished roof system and as required for the Work. Subcontractor shall coordinate with the Roofing Subcontractor relative to location and schedule and shall participate in assuring that any penetrations for the above items are weather tight. The Roofing Subcontractor shall be responsible to flash and/or seal all items above in a manner approved by manufacturer to receive the specified Warranty.
- N. This Subcontractor shall seal all penetrations through walls, roofs, or ceilings resulting from the installation of the conduit, cable, and equipment under this bid package. Subcontractor shall provide approved fire stopping where required per drawing, specification, or by code.
- O. This Subcontractor shall provide Identification of Penetration Fire Stopping as required by the Contract Documents and Authorities Having Jurisdiction.
- P. This Subcontractor shall be responsible for drainage and dewatering of the work under this Bid Package. Contractor shall use pumps and temporary ditching as necessary to remove water from the site and discharged per the SWPP plan.
- Q. This Subcontractor shall provide its own site utility excavation, bedding and backfill for underground conduits, and/or utilities that it is responsible for installing. Backfill material must be properly compacted, and premium fill must be used under pavement and building slab areas.
- R. This Subcontractor shall provide site lighting including concrete bases as shown on the drawings.
- S. This Subcontractor shall be responsible for off-site removal and legal disposal of excess soils generated by the work of this bid package as they are generated. Excess soils shall be removed from the site on a daily basis and shall not be allowed to accumulate onsite.
- T. This Subcontractor shall furnish all required duct detectors to the HVAC Subcontractor for installation. Wiring of duct detectors shall be by this Subcontractor.
- U. This Subcontractor shall provide all wiring, switches, detectors, lighting, and other power required for the elevator.
- V. This Subcontractor is responsible to wire all flow and tamper switches provided by the Fire Protection Contractor.
- W. This Subcontractor shall assist with all final inspections as required to achieve Certificate of Occupancy in accordance with the project schedule. This includes providing manpower as required to assist with fire protection system, kitchen exhaust hood, and elevator final inspections and testing.
- X. This Subcontractor shall provide temporary power for a 400-amp temp service and temporary lighting / power utility cost will be not by this contractor and handled by the CM.

- Y. This Subcontractor must be present on-site during pours when this Subcontractor's work is being covered and/or encased in concrete.
- Z. This Subcontractor shall coordinate labeling requirements with final room identifications if other than identifications shown on the Contract Documents. This Subcontractor shall coordinate a cabling Label Matrix. Coordinate with the Construction Manager, Owner, and Architect to ensure room number scheme matches permanent room plans and labeling performed by electrical Subcontractor.
- AA. This Subcontractor shall make all final electrical connections for equipment, including all Plumbing and HVAC equipment.
- BB. This Subcontractor shall be responsible for coordinating rough-in locations with other trades to avoid conflicts with casework, visual display boards, and other wall mounted items.
- CC. In areas with exposed ceilings, this Subcontractor shall install overhead rough-in as high as possible and shall make wall penetrations as close to the deck level as possible.
- DD. This Subcontractor shall provide rough-in at exterior door frames for Access Control door contacts.
- EE. This Subcontractor shall furnish and install all access panels shown on the Electrical Drawings or not otherwise shown on the Contract Drawings but required by the work of this bid package.
- FF. This Subcontractor shall provide all electrical equipment vaults required for equipment installed under this bid package exterior electrical mechanical pads will be by the concrete contractor.
- GG. This Subcontractor shall install the owner provided the emergency generator.
- HH. This Subcontractor shall install the owner provided the automatic transfer switches.
- II. This Subcontractor shall assist the Commissioning Authority in all commissioning activities related to the work of this bid package.
- JJ. This Subcontractor shall install all power supplies for electronic door hardware furnished by the General Trades Subcontractor.
- KK. This Subcontractor shall install all ADA push buttons for automatic doors operators including connection of the push buttons to the operators.
- LL. This Subcontractor shall install and wire all motor starters and variable frequency drives furnished by other trades.
- MM. This Subcontractor shall supply power for all motorized equipment as indicated on Contract Documents.
- NN. This Subcontractor shall provide all code required disconnect switches, including those which may not be indicated in the Contract Documents.
- OO. This Subcontractor shall be responsible for providing support of acoustical ceiling lay-in light fixtures from structure above as indicated in the Contract Documents and as required by applicable code and Authority Having Jurisdiction.

- PP. This Subcontractor is responsible for providing its own cut-outs in ceiling tile for can lights, fire alarm devices, and other ceiling mounted items. Ceiling tile shall be furnished by Interior Framing Subcontractor.
- QQ. This Subcontractor shall install all electric hand dryers. Hand Dryers will be furnished by the General Trades Subcontractor. This Subcontractor shall be responsible for coordinating with the Subcontractor for proper hand dryer rough-in requirements.
- RR. This Subcontractor shall provide the plywood backboards for all technology and electronic safety & security equipment as indicated in the Contract Documents, including painting of plywood backboards.
- SS. This Subcontractor shall provide all communications and electronic safety and security cabling as indicated in the Contract Documents, including terminations, jacks, devices, wall plates, patch cords, patch panels, and any other components required for testing and certification of cabling.
- TT. This Subcontractor shall provide testing and certification of communications and electronic safety & security cabling as indicated in the Contract Documents.
- UU. This Subcontractor shall provide the IP Central Sound System as indicated in the Contract Documents.
- VV. This Subcontractor shall be responsible for all electrical, fire alarm plan review, permit, and inspection fees required by Authorities Having Jurisdiction.
- WW. This Subcontractor shall be responsible for initial survey and testing per Authority Having Jurisdiction.
- XX. Requirements to determine if a Distributed Antenna System is necessary. All other requirements or equipment will be determined after testing.
- YY. This Subcontractor shall refer to Specification Sections Alternates and Temporary Facilities for additional scope of work requirements.

End of Bid Package #20

SECTION 011400
WORK RESTRICTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes information relating to work restrictions.

1.3 GENERAL

- A. General: Contractor shall have limited use of premises for construction operations. Coordinate all Work with the Owner.
- B. Use of Site: Do not disturb portions of Project site beyond areas in which the Work is indicated. Confine construction operations to immediate Project area.
 - 1. Allow for Owner occupancy of Project site and use by the public.
- C. Building Protection: Maintain existing building in a weathertight condition throughout construction period. Repair damage caused by construction operations. Protect building and its occupants during construction period.

1.4 DELIVERIES/EXISTING DRIVES

- A. Driveways and Entrances: Keep driveways, loading areas, and entrances service premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - 1. Schedule deliveries to minimize use of driveways and entrances.
 - 2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
 - 3. All deliveries must be received by Contractor personnel. Owner will not accept deliveries.

1.5 OWNER'S EXISTING PARKING AREAS

- A. Existing parking areas of the Owner's facility may or may not be used for construction personnel parking. Coordinate with the Owner, the location and limits of existing parking areas available for use by construction personnel.

1.6 EXISTING ELEVATOR USAGE

- A. Use of existing elevators is prohibited.

1.7 ALLOWABLE WORK HOURS

- A. Work shall be generally performed inside the existing building during normal business working hours of 7:00 a.m. to 6:00 p.m., Monday through Saturday, unless otherwise indicated.
 - 1. Owner reserves the right to require portions of the Work that disrupt Owner's activities to be performed during hours which vary from above. Contractors should anticipate and include provisions in their bid. Activities include but are not limited to the following:
 - a. Core Drilling: Between 2:00 p.m. – 6:00 p.m.
 - b. Saw cutting of Floor Slab: 2:00 p.m. – 6:00 p.m.

1.8 NOISE CONTROL

- A. Each Contractor shall minimize construction related noise. Noise producing work shall be performed in less sensitive hours of the day and as directed by the Owner or Construction Manager. Maintain noise produced by the Work at or below 75 decibel levels.
- B. Each Contractor shall provide all necessary equipment or sound-deadening devices, and shall take all practicable noise abatement measures that are necessary to comply with the requirements of the Owner.
 - 1. Provide shields or other physical barriers to restrict the transmission of noise.
 - 2. Provide soundproof housings or enclosures for noise-producing machinery.
 - 3. Provide efficient silencers on air intakes for equipment.
 - 4. Provide efficient intake and exhaust mufflers on internal combustion engines that are maintained to have equipment perform below noise levels as required.
 - 5. Provide lining of hoppers and storage bins with sound deadening material.
 - 6. Conduct truck loading, unloading and hauling operations so that noise is kept to a minimum.
- C. Noise levels will be at the property line or 50 feet from the source, whichever is greater. Sound levels will be measured on the A weighing network of a General Purpose sound level meter at slow response. To minimize the effect of reflective sound waves at buildings, measurements may be taken three to six feet in front of any building face.

1.9 EXISTING UTILITY INTERRUPTIONS

- A. Do not interrupt utilities service unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two weeks in advance of proposed utility interruptions.
 - 2. Do not proceed with utility interruptions without Owner's approval.
- B. Utility Shutdown Restriction
 - 1. Domestic Water: Work shall be performed on weekend.

1.10 EXISTING STAIR

- A. Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
 - 1. Provide protective coverings, barriers, devices, signs or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

1.11 EXISTING FACILITY USE

- A. Contractor personnel shall not enter the existing facility except to perform work required by the Contract.
- B. Toilet Facilities: Use is not permitted.
- C. Dining Facilities: Use is not permitted.

1.12 SMOKING

- A. Smoking is not permitted within the project area, building or outside on the property.

1.13 OWNER PROTOCOLS

- A. Abide by all Owner protocols regarding construction activities on site. Participate in training sessions if applicable.

1.14 OWNER'S OCCUPANCY REQUIREMENTS

- A. Full Owner Occupancy: Owner will occupy site and existing building during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits, unless otherwise indicated.
 - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
 - 2. Provide not less than two week notice to Owner of activities that will affect Owner's operations.
- B. Owner Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed areas of building, before Substantial Completion, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and partial occupancy shall not constitute acceptance of the total Work.
 - 1. Obtain a Certificate of Occupancy from authorities having jurisdiction before Owner occupancy.
 - 2. Before partial Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems service occupied portions of building.

3. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of building.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 011403

UNIT PRICES

PART 1 – GENERAL

1.1 RELATED DOCUMENTS

- A. All drawings and specifications by including as listed therein: Bidding Requirements, Contract Documents, General Specifications and Technical Specifications, Geotechnical Report, and Any and All Addenda.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for unit prices.
 - 1. A unit price is an amount proposed by Bidders and stated on the Bid Form as a price per unit of measurement for materials or services that will be paid from allowances or added to or deducted from the Contract Sum by Change Order in the event the estimated quantities of Work required by the Contract Documents are increased or decreased.
 - 2. Unit prices include all necessary material, overhead, profit and applicable taxes.
 - 3. The Independent Testing Agency shall be solely responsible for determination of unit price quantities used.

1.3 PRODUCTS (not applicable)

1.4 EXECUTION (not applicable)

- A. Unsuitable Soils Removal/Replacement w/Soils

\$ _____ / CU YD of replacement

Upon written direction from the CMR under consultation of the Architect / Owner's geotechnical engineer, Contractor shall excavate, haul off-site and dispose in a legal manner, material deemed by the Geotechnical engineer to be unsuitable. Contractor will then import fill material for the purpose of replacing unsuitable material removed from the site. The unit price shall include all direct and indirect costs associated with the excavation, loading, trucking, disposal off site, and placement of void with engineered fill. This allowance will not be utilized to remedy any on site material that becomes unsuitable solely as a result of the contractor's failure to adequately de-water the site. The off-site source shall be submitted at least five (5) work days in advance of execution of this work to enable the owner to conduct soil and environmental testing of the proposed material. In the event that the material is determined by the owner's testing consultants to be unacceptable. Contractor shall provide an alternate full source at no additional costs to the owner. This allowance will not be utilized to provide the necessary fill quantities to achieve elevations shown on the contract documents. That necessary import shall be included in the Contractor's base bid.

- B. Unsuitable Soils Removal/Replacement w/Granular

\$ _____ / CU YD of replacement

Upon written direction from the CMR under consultation of the Architect / Owner's geotechnical engineer, Contractor shall excavate, haul off-site and dispose in a legal manner, material deemed by the Geotechnical engineer to be unsuitable. Contractor will then import fill material for the purpose of replacing unsuitable material removed from the site. The unit price shall include all direct and indirect costs associated with the excavation, loading, trucking, disposal off site, and placement of void with ODOT 304 Limestone Aggregate Base Material. This allowance will not be utilized to remedy any on site material that becomes unsuitable solely as a result of the contractor's failure to adequately de-water the site. The off-site source shall be submitted at least five (5) work days in advance of execution of this work to enable the owner to conduct soil and environmental testing of the proposed material. In the event that the material is determined by the owner's testing consultants to be unacceptable. Contractor shall provide an alternate full source at no additional costs to the owner. This allowance will not be utilized to provide the necessary fill quantities to achieve elevations shown on the contract documents. That necessary import shall be included in the Contractor's base bid.

C. Unsuitable Soils at Foundations Removal Off-Site & Replacement w/Footer Mix Concrete

\$_____ / CU YD of replacement

Upon written direction from the CMR under consultation of the Architect / Owner's geotechnical engineer, Contractor shall excavate, haul off-site and dispose in a legal manner, material deemed by the Geotechnical engineer to be unsuitable. Contractor will then import fill material for the purpose of replacing unsuitable material removed from the site. The unit price shall include all direct and indirect costs associated with the excavation, loading, trucking, disposal off site, and placement of void with Footer Mix Concrete. This allowance will not be utilized to remedy any on site material that becomes unsuitable solely as a result of the contractor's failure to adequately de-water the site. The off-site source shall be submitted at least five (5) work days in advance of execution of this work to enable the owner to conduct soil and environmental testing of the proposed material. In the event that the material is determined by the owner's testing consultants to be unacceptable. Contractor shall provide an alternate full source at no additional costs to the owner. This allowance will not be utilized to provide the necessary fill quantities to achieve elevations shown on the contract documents. That necessary import shall be included in the Contractor's base bid.

END OF SECTION

SECTION 012300

ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the Bidding Requirements that may be added to or deducted from the Base Bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.
- D. Schedule: A Schedule of Alternates is included at the end of this Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. Alternate No. G-1:

1. Base Bid: No Greenhouse. Provide underground utility conduits and pathways as indicated on the drawings.
2. Alternate: Provide freestanding Greenhouse with all utilities and services as indicated on the drawings.

B. Alternate No. G-2:

1. Base Bid: Provide limited demolition and new work as indicated on the drawings for connection to the existing building at the north end of the new Sky Bridge. Base bid includes limited work within the existing building.
2. Alternate: Provide all demolition and new work as indicated on the drawings for development of the existing open classroom space within the existing building at the north end of the new Sky Bridge.

C. Alternate No. G-3:

1. Base Bid: Provide exterior face brick at the single story portion of the proposed facility and also at each of the two exit stair towers. Brick color, style and detailing as indicated in the construction documents.
2. Alternate: Provide composite metal panel wall system in lieu of exterior face brick at the single story portion of the proposed facility and also at each of the two exit stair towers.

END OF SECTION

SECTION 012500

SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions after contract award.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
 - 1. Substitution Request Form: Use CSI Form 13.1A.
 - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
 - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
 - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
 - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

- d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
- e. Samples, where applicable or requested.
- f. Certificates and qualification data, where applicable or requested.
- g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
- h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
- i. Research reports evidencing compliance with building code in effect for Project.
- j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
- k. Cost information, including a proposal of change, if any, in the Contract Sum.
- l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
- m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

1.5 QUALITY ASSURANCE

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

1.6 PROCEDURES

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

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 21 days prior to time required for preparation and review of related submittals.
 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
 - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - b. Requested substitution provides sustainable design characteristics that specified product provided.
 - c. Substitution request is fully documented and properly submitted.
 - d. Requested substitution will not adversely affect Contractor's construction schedule.

- e. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - f. Requested substitution is compatible with other portions of the Work.
 - g. Requested substitution has been coordinated with other portions of the Work.
 - h. Requested substitution provides specified warranty.
 - i. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
- a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
 - b. Requested substitution does not require extensive revisions to the Contract Documents.
 - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
 - d. Requested substitution provides sustainable design characteristics that specified product provided.
 - e. Substitution request is fully documented and properly submitted.
 - f. Requested substitution will not adversely affect Contractor's construction schedule.
 - g. Requested substitution has received necessary approvals of authorities having jurisdiction.
 - h. Requested substitution is compatible with other portions of the Work.
 - i. Requested substitution has been coordinated with other portions of the Work.
 - j. Requested substitution provides specified warranty.
 - k. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SUBSTITUTION REQUEST FORM

DATE REQUESTED: _____ PROJECT _____

Originally Specified Product:

Specification Section:

Article/Paragraph (Page):

Specified Item:

Proposed Product:

Substitution:

Model Name / Number:

Manufacturer:

Manufacturer Phone:

Attach complete technical data including laboratory tests if applicable. Include complete information changes to Drawings and/or Specifications which proposed substitution requires for proper installation.

A. Is all technical data, including laboratory tests (if applicable) attached to this request?
(If no, your submittal will be rejected)

Yes No N/A

B. Is a list and explanation of all necessary changes to the Drawings and/or Specifications required for proper installation of the proposed product? (If no, your submittal will be rejected)

Yes No N/A

C. Does the substitution affect dimensions shown on Drawings? (If yes, explain on attached)

Yes No N/A

D. Will the undersigned pay for changes to building design, including engineering and detailing costs caused by substitution, if any? (If no, your submittal will be rejected)

Yes No N/A

E. What effect does substitution have on other trades?

F. Explain all differences between proposed substitution and specified item.

G. Do the manufacturer's guarantees / warranties of proposed substitution differ from those specified?
(If yes, explain on attached)

Yes No N/A

H. Does product meet LEED requirements, if applicable?

Yes No N/A

The undersigned certifies that the function, appearance and quality are equivalent or superior to the specified item.

Submitted By: _____ REVIEWED BY HASENSTAB ARCHITECTS, INC.

Firm: _____ Accepted As Submitted:

Address: _____ Accepted As Noted:

Address: _____ Rejected: Received Too Late:

Phone: _____ Rejected: Not Approved Substitution:

E-Mail: _____ Date:

SECTION 012600

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.3 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.4 PROPOSAL REQUESTS

- A. Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
 - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
 - 2. Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change. Failure to submit a reply within 10 days indicates acceptance of the work with no change in contract cost or time.
 - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
 - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
 - c. Include costs of labor and supervision directly attributable to the change.
 - d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Proposal Request Form: AIA Document G709.

1.5 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
 - 1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
 - 1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.6 CHANGE ORDER

- A. Architect may issue a Change Order on AIA Document G701 for changes in the Work to adjust the Contract Sum or the Contract Time.
 - 1. Owner's approval of a Proposal Request.
 - 2. Owner's and Contractor's agreed upon change to Contract Sum or Contract Time of a Construction Change Directive.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 012900
PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 SCHEDULE OF VALUES

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

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

- a. Application for Payment forms with Continuation Sheets.
- b. Submittals Schedule.
- c. Contractor's Construction Schedule.

- 2. Submit the Schedule of Values to Architect at earliest possible date but no later than ten days before the date scheduled for submittal of initial Applications for Payment.

- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the Schedule of Values. Use AIA Document G702 and AIA Document G703 Continuation Sheets. Alternate forms containing same information as AIA documents are acceptable subject to approval of Architect.

- 1. Schedule of Values Format: A sample Schedule of values format has been included at the end of this section for reference by the Contractor. This form represents the minimum "Schedule of Values" submittal requirements for the work breakdown of each Contract. Prior to submitting the "Schedule of Values" for approval, the Contractor will be required to refine this list to specifically relate only those items that pertain to the Work of the Contract. Be advised that the Owner, Architect and Construction manager reserve the right to modify existing and/or add additional categories and subcategories during the review and approval process. Labor and/or Material Costs must be completed for each category line item applicable to the Work of the Contract.

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

- a. Item Number.
- b. Related Specification Section or Division.

- c. Description of the Work.
 - 1) When the Work occurs in multiple phases or on multiple levels and elevations include separate line items or subcategories for the Description of the Work by Area, Floor or Building Elevation.
- d. Dollar value of Labor associate with item.
- e. Dollar value of Material associated with item.
- f. Dollar value of Schedule Value Total.
 - 1) Percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
- 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents.
- 4. Provide several line items for Bonds, Insurances, Mobilization, Permits and Fees, Coordination Drawings, Submittals, Supervision, Punch List activities, Attic Stock Materials, Operation and Maintenance manuals, Project Record Documents (As-built drawings), and Demonstration and Training Sessions.
- 5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
- 6. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
- 7. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
- 8. Temporary Facilities and Controls: Provide a separate line item in the Schedule of Values for each.
- 9. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
- 10. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

1.4 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement. Detailed submittal requirements will be coordinated with the Owner.

- C. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.
 2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- D. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect. One copy shall include waivers of lien and similar attachments if required.
- E. Waivers of Mechanic's Lien:
1. Each Prime Contractor shall submit with each Application for Payment a "Conditional Waiver and Release on Progress Payment for use by Prime Contractors" for the value of the current payment value requested.
 2. During the course of the Project, the Owner at their discretion, may request final waiver information from subcontractors and suppliers associated with items indicated as complete on the pay application.
 3. Waiver Forms: Submit waivers of lien and affidavit's of payment on forms, executed in a manner acceptable to Owner.
 4. Refer to Division 00 Section "Lien Waivers" for Owner-required lien waiver instructions and forms to be utilized.
- F. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors and their corresponding work from the Schedule of Values.
 2. Schedule of Values.
 3. Contractor's Construction Schedule.
 4. Submittals Schedule.
 5. Copies of building permits including permits relating to MEP work.
 6. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 7. Certificates of insurance and insurance policies.
 8. Performance and payment bonds.
 9. Data needed to acquire Owner's insurance.
- G. Application for Payment at Substantial Completion: After receipt of the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- H. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.

2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
3. Updated final statement, accounting for final changes to the Contract Sum.
4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
5. Release of liens on Owner's required forms. Refer to Division 00 Section "Lien Waivers" for Owner-required lien waiver instructions and forms to be utilized.
6. AIA Document G707, "Consent of Surety to Final Payment", if applicable.
7. Evidence that claims have been settled.
8. Final, liquidated damages settlement statement, if applicable.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

- A. See attached example of Contractors Schedule of Values Form.

END OF SECTION

Example "Schedule of Values (SOV)" Form					
CONTRACT ITEMS			SCHEDULE OF VALUES		
Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
DIVISION 1 - GENERAL REQUIREMENTS					
	001000	Construction Contingency			
	001800	Insurances and Bonds			
		General Liability			
		Builder's Risk (if applicable)			
		Bonds (if applicable)			
		Performance / Payment Bonds			
		Landscaping Bonds			
	002000	Pre-Construction Services (if applicable)			
	002010	Direct Personal Expense - Construction Staffing			
	002020	Permits and Fees			
		Building Permit			
		Zoning Permit			
		Soil and Water Erosion Control			
		Sanitary Sewer Tapping Fees			
		Water Service Tapping Fees			
	002040	Direct Expenses			
	005000	CM Fee (if applicable)			
	012100	Allowances			
	013110	Coordination Drawings			
		MEP/T Systems			
		Building Envelope Systems			
	013200	Project Scheduling			
	013533	Infection Control Procedures			
	014000	Quality Requirements			
		Room Pressurization Testing (if not included in Mechanical)			
		Mechanical Test and Balance (if not included in Mechanical)			
	014001	Mock-ups			
		Building Exterior Mock-ups			
		Interior Room Mock-ups			
		Cabinetry Mock-ups			
	015000	Temporary Facilities and Controls			
		Mobile Field Office			
		Safety Railings and Barricades			
		Temporary Security Fencing			
		Storage and Fabrication Sheds			
		Temporary Stairs			
		Temporary Heat & Fuel, Ventilation and Humidity Control			
		Project Sign			
		Traffic Control Signs			
		Temporary Water (if not in Plumbing / Consumption Charges by Owner)			
		Sanitary Facilities (Portable Chemical Toilets)			
		Snow Removal			
		Dumpsters for all Construction Debris			
		Daily Clean-Up			
		Final Clean-up			
		Temporary Power (if not in Electrical / Consumption Charges by Owner)			
		Temporary Lighting (if not in Electrical / Consumption Charges by Owner)			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
	015329	Interim Life Safety			
	017329	Cutting and Patching (if not included in another trades work scope)			
	017700	Closeout Procedures			
		Punch List Activities			
	017823	Operation and Maintenance Data (Manuals)			
	017839	Project Record Documents (As-Builts Drawings)			
	017900	Demonstration and Training			
DIVISION 2 - EXISTING CONDITIONS					
	022100	Surveying			
	024100	Demolition			
	024119	Selective Demolition			
	025000	Site Remediation			
		Asbestos			
		Lead Paint			
DIVISION 3 - CONCRETE					
	033000	Cast-in-Place Concrete			
		Footings and Foundations			
		Frost Slabs and Foundations			
		Slab-on-Grades (by floor and/or area)			
		Slab-on-Deck (by floor and/or area)			
		Rooftop Equipment Pads			
		Mechanical Equipment Pads			
	034000	Precast Concrete			
		Wall Panels (by floor and/or area)			
		Hollow Core Planks (by floor and/or area)			
	035416	Hydraulic Cement Underlayment (by floor and/or area)			
	033543	Polished Concrete Finishing			
DIVISION 4 - MASONRY					
	042000	Unit Masonry (by elevation)			
	047200	Cast Stone Masonry (by elevation)			
	047300	Adhered Manufactured Stone Veneer (by elevation)			
DIVISION 5 - METALS					
	051200	Structural Steel Framing (by level)			
	051213	Architectural Exposed Structural Framing (by element if more than one)			
	052100	Steel Joist Framing / Bridging			
	053100	Steel Decking			
		Composite Metal Decking (by floor)			
		Roof Decking			
	054000	Cold-Formed Metal Framing (by elevation and/or area)			
	055000	Miscellaneous Metal Fabrications			
	055113	Metal Pan Stairs (by Stair Tower)			
	055213	Pipe and Tube Railings			
	055600	Equipment Support Systems (by room)			
	057313	Glazed Decorative Metal Railings			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
DIVISION 6 - WOOD AND PLASTICS					
	061053	Miscellaneous Rough Carpentry			
		Interior Wood Blocking / Backing (by floor or area)			
		Exterior Wood Blocking			
		Roof Parapet Blocking			
	061600	Sheathing			
		Exterior Gypsum Sheathing (by Elevation and/or Area)			
		Wood Sheathing (by Elevation and/or Area)			
	064000	Interior Architectural Woodwork			
		Cabinets and Countertops (by floor and/or area)			
		Window Stools (by floor and/or area)			
		Wood Trim (by floor and/or area)			
	064216	Flush Wood Paneling			
	064219	Plastic Laminate-Faced Wood Paneling			
DIVISION 7 - THERMAL AND MOISTURE PROTECTION					
	071326	Self-Adhered Sheet Waterproofing (by elevation)			
	072100	Thermal Insulation			
		Foundation Insulation (if not include in concrete)			
		Continuous Insulation (by elevation, may be included with corresponding veneer)			
		Spray Foam Insulation			
	072419	Water-Drainage Exterior Insulation and Finish System (by elevation)			
	072500	Weather Barriers (by elevation)			
	072726	Fluid-Applied Membrane Air and Water-Resistive Barriers (by elevation)			
	073113	Asphalt Shingles (by area or each building)			
	074113	Metal Roof Panels (by area or each building)			
	074213.16	Metal Plate Wall Panels (by elevation)			
	074213.23	Metal Composite Material Wall Panels (by elevation)			
	074229	Terracotta Wall Panels (by elevation)			
	075323	EPDM Roofing (by area or each building)			
	075416	KEE Roofing (by area or each building)			
	075423	TPO Roofing (by area or each building)			
	076200	Sheet Metal Flashing and Trim (by each specialty flashing shape profile)			
	077100	Roof Specialties			
		Copings (by each type and/or finish)			
	077200	Roof Accessories - Hatches / Accesses			
	078100	Applied Fireproofing (by floor and/or by area)			
	078123	Intumescent Fireproofing (by floor and/or by area)			
	078413	Penetration Firestopping (by floor and/or by area)			
	078446	Joint Firestopping (by floor and/or by elevation)			
	079200	Joint Sealants (by sealant type - JS-'X')			
	079513.13	Interior Expansion Joint Cover Assemblies (by type)			
	079513.16	Exterior Expansion Joint Cover Assemblies (by type)			
DIVISION 8 - DOORS AND WINDOWS					
	081113	Hollow Metal Doors, Frames, and Hardware			
		Hollow Metal Frames (by floor)			
		Hollow Metal Doors (by floor, includes door hardware)			
	081416	Flush Wood Doors and Hardware			
		Flush Wood Doors (by floor, includes door hardware)			
	083113	Access Doors and Frames (by type and by floor)			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
	083313	Coiling Counter Doors (by area or door tag)			
	083323	Overhead Coiling Doors (by area or by door tag)			
	083613	Section Doors (by area or by door tag)			
	084113	Aluminum-Framed Entrances and Storefronts			
		Framing (by elevation and/or by area)			
		Glazing (by elevation and/or by area)			
		Entrance Doors (by door tag, includes door hardware)			
	084229.23	Sliding Automatic Entrances (by door tag, includes door hardware)			
	084413	Glazed Aluminum Curtain Walls (by elevation and/or by area)			
		Framing (by elevation and/or by area)			
		Glazing (by elevation and/or by area)			
	087100	Door Hardware (included above with each door type)			
	087113	Automatic Door Operators (by operator type - single or double)			
	088000	Glazing (Storefront / Curtain Wall Glazing included above)			
		Borrow Lite Glazing			
		Interior Hollow Metal / Wood Door Glazing			
		Fire Rated Glazing			
	089000	Louvers and Vents (by elevation and/or area)			
DIVISION 9 - FINISHES					
	092116.23	Gypsum Board Shaft Wall Assemblies (by floor and/or by area)			
	092216	Non-Structural Metal Framing (by floor and/or by area)			
	092713	Glass-Fiber-Reinforced Gypsum Fabrications (by type)			
	092900	Gypsum Board (by floor and/or by area)			
		Interior Sound Attenuation Insulation (by floor and/or by area)			
	093013	Ceramic Tiling			
		Floor Preparation (by floor)			
		Crack Isolation / Waterproofing Membranes (by floor)			
		Tiling (by floor and by each finish tag: CT-"X")			
		Accessories and Trims			
	095113	Acoustical Panel Ceilings			
		Grid (by floor and by each grid type)			
		Ceiling Tiles (by floor and by each ceiling tile type)			
	095426	Suspended Wood Ceiling and Wall Panels			
		Framing / Grid (by floor and by each grid type)			
		Wood Slatting (by floor and by each ceiling tile type)			
	096513	Resilient Base and Accessories			
		Base (by floor and by each finish tag)			
		Transitions (by floor)			
	096516	Resilient Sheet Flooring			
		Floor Preparation (by floor)			
		Resilient Sheet (by floor and by each finish tag)			
	096519	Resilient Tile Flooring			
		Floor Preparation (by floor)			
		Resilient Tile (by floor and by each finish tag)			
	096536	Static-Control Resilient Flooring			
		Floor Preparation (by floor)			
		Static-Control Flooring (by floor and by each finish tag)			
	096600	Precast Epoxy Terrazzo (by floor and/or by area)			
	096623	Resinous Matrix Terrazzo Flooring (by floor and/or by area)			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
	096816	Tile Carpeting			
		Floor Preparation (by floor)			
		Tile Carpeting (by floor and by each finish tag)			
	096816	Sheet Carpeting			
		Floor Preparation (by floor)			
		Sheet Carpeting (by floor and by each finish tag)			
	097200	Wall Coverings (by floor and by each finish tag)			
	098433	Sound-Absorbing Wall Units (by floor and by each finish tag)			
	099113	Exterior Painting (by elevation or by each element)			
	099123	Interior Painting			
		Walls (by floor and or by area)			
		Floor Sealers (by floor and or by area)			
		Fire / Smoke Wall Labeling (by floor and or by area)			
	099672	Fluid Applied Insulating Coating (by area or by building element)			
DIVISION 10 - SPECIALTIES					
	101100	Visual Display Surfaces (by floor and by type)			
	101423	Panel Signage (by floor)			
	102113.13	Metal Toilet Compartments (by rooms)			
	102113.14	Stainless Steel Toilet Compartments (by rooms)			
	102113.19	Plastic Toilet Compartments (by rooms)			
	102123	Cubicles Curtains and Track			
		Tracks (by floor)			
		Curtains (by floor)			
	102600	Wall Protection (by floor and/or by area)			
	102800	Toilet, Bath, and Laundry Accessories (by floor and by each type)			
	104413	Fire Extinguisher Cabinets (by floor and by type)			
	104416	Fire Extinguishers (by floor and by type)			
	105113	Metal Lockers (by room)			
DIVISION 11 - EQUIPMENT					
	117000	Healthcare Equipment (by floor and by each tag)			
DIVISION 12 - FURNISHINGS					
	122413	Roller Window Shades (by floor and by elevation)			
DIVISION 13 - SPECIAL CONSTRUCTION					
	134900	Radiation Protection (by room)			
DIVISION 14 - CONVEYING SYSTEMS					
	142123.16	Machine Room-less Electric Traction Passenger Elevators (by each elevator cab tag)			
	142400	Hydraulic Elevators (by each elevator cab tag)			
DIVISION 21 - FIRE SUPPRESSION					
	210000	Fire Suppression - General			
		Permits			
		Engineering			
		Identification and Labeling			
		Testing / Closeout			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
		Wet-Pipe Sprinkler System			
		Service Entrance Riser Piping and Equipment			
		Rough-in (by floor)			
		Finish (by floor)			
		Dry-Pipe Sprinkler System			
		Dry System Equipment			
		Rough-in (by floor)			
		Finish (by floor)			
DIVISION 22 - PLUMBING					
	220000	Plumbing - General			
		Permits			
		Identification and Labeling			
		Disinfection			
		Testing, Balancing, and Adjusting / Closeout			
		Sanitary Waste and Vent Piping			
		Underground			
		Rough-in (by each floor)			
		Domestic Water Piping and Specialties			
		Water Service Entrance Equipment, Valves, and Accessories			
		Equipment - Hot Water Heaters / Boilers			
		Underground (if applicable)			
		Rough-in (by each floor)			
		Plumbing Insulation (by each floor)			
		Plumbing Fixtures (by each floor)			
		Storm Drainage Piping			
		Underground			
		Rough-in (by each floor)			
		Roof Drains and Overflow Outlets			
		Plumbing Insulation (by each floor)			
		Natural Gas Systems			
		Meters and Meter Setting Accessories			
		Rough-in (by each floor)			
		Connections to Equipment			
		Painting (exposed gas piping if not included in painting scope of work)			
		Medical Gas and Vacuum Systems			
		Equipment			
		Zone Valves (by each floor)			
		Rough-in (by each floor)			
		Controls / Monitoring Systems			
		Testing / Purifying / Certification			
DIVISION 23 - HEATING, VENTILATING, AND AIR CONDITIONING (HVAC) - MECHANICAL					
	230000	HVAC (Mechanical) - General			
		Coordination Drawings			
		Identification and Labeling			
		Ductwork Pressure Testing			
		HVAC System Testing, Balancing, and Adjusting / Closeout			
		Equipment and Piping Identification – HVAC			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
		Hydronic Piping, Valves, and Specialties			
		HVAC Piping and connections to equipment (by floor)			
		HVAC Insulation (by floor)			
		Radiant Heat Panels			
		Cabinet Unit Heaters			
		Metal Ductwork / Air Inlets and Outlets			
		Shaft Ductwork Mains (for each AHU or RTU)			
		HVAC Shaft Ductwork Insulation (for each AHU or RTU)			
		Supply, Return, and Exhaust branch ductwork (by floor)			
		HVAC Branch Ductwork Insulation (by floor)			
		Diffusers and Grilles (by floor)			
		Breeches and Vents			
		HVAC Equipment			
		Boilers			
		AHU's / RTU's (including curbs)			
		Vibration Isolation Curbs (if applicable)			
		Exhaust Fans (including curbs)			
		Dampers			
		Air Curtains			
		Louvers			
		Unit Heaters			
		Terminal Units (VAV / CV) / Fan Powered Boxes (FPB)			
		Split Systems (including curbs for roof mounted equipment)			
		VFD's			
		Hydronic Pumps			
		Humidifiers			
		Water Treatment Systems			
		Instrumentation and Control for HVAC			
		Headend Equipment			
		Temperature Control Rough-in (by floor)			
		T-stat and Sensors (by floor)			
		Programming			
		System Start-up / Testing / Verification			
DIVISION 26 - ELECTRICAL					
	260000	Electrical - General			
		Permits			
		Temporary Electrical Service (if not included in General Requirements)			
		Temporary Power and Lighting (if not included in General Requirements)			
		Identification and Labeling			
		Site Electrical			
		Excavation / Conduit (Power, Data, Cable, etc.)			
		Electrical Vaults / Pads			
		Site Lighting			
		Excavation / Conduit			
		Concrete Bases			
		Poles / Fixtures			
		Lighted Bollards			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
		Electrical Distribution			
		Equipment / Gear			
		Overcurrent Protective Device Coordination Study			
		Dry-Type Transformers			
		Generators			
		Automatic Transfer Switches			
		Meter Can			
		Grounding Loop			
		Panelboards (by floor)			
		Disconnect Switches / Fuses (by floor)			
		Conduit (by floor)			
		Feeders / Wire (by floor)			
		Branch Circuits - Power / Lighting			
		Underground (if applicable)			
		Conduit (by floor)			
		Wire (by floor)			
		Devices (by floor)			
		Light Fixtures (by floor)			
		Lighting Controls			
		Connections to Mechanical Equipment (by floor)			
		Lightning Protection			
		Rough-in			
		Cabling on Roof			
		Air Terminals			
DIVISION 27 - COMMUNICATIONS					
	271000	Communications Systems			
		Cabinets, Racks, Frames, and Enclosures			
		Backbone Cabling			
	272000	Voice / Data Systems			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			
	274000	Audio-Visual Systems			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			
	275200	Nurse Call Systems			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			
DIVISION 28 - ELECTRONIC SAFETY AND SECURITY					
	281000	Access Control			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			
	282000	Video Surveillance			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
	283000	Security Detection, Alarm, and Monitoring			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			
	284600	Fire Alarm System			
		Permit			
		Engineering			
		Rough-in (by floor)			
		Equipment Panels / Hardware			
		Devices (by floor)			
		Emergency Response Communications System			
DIVISION 31 - EARTHWORK					
	311000	Site Clearing			
		Mobilization			
		SWPPP			
		Tree Clearing			
		Site Demolition			
		Temporary Drives and Access Roads			
	312000	Earth Moving			
		Earthwork			
		Grading			
		Building Pad			
DIVISION 32 - EXTERIOR IMPROVEMENTS					
	321216	Asphalt Pavement			
		Limestone Base			
		Standard Duty Pavement			
		Heavy Duty Pavement			
		Miscellaneous Patching			
		Pavement Markings			
	321313	Concrete Pavement			
		Limestone Base			
		Concrete Paving			
	321600	Concrete Curbs, Walks, and Curb Ramps			
		Curbs			
		Ramps			
		Limestone Base			
		Sidewalks			
	323113	Chain Link Fences & Gates			
	323120	Ornamental Fencing			
	323300	Site Furnishings and Amenities			
		Bollards			
		Bollard Covers			
		Furniture			
		Trash Receptacles			
		Site Signage (Stop, Fire Dept. Access, FDC, etc.)			
	328000	Irrigation			
	329000	Plantings			
	329200	Lawns and Grasses			

Item #	Spec Section	Description	Labor	Material	Scheduled Value Total
DIVISION 33 - UTILITIES					
	331000	Water Utilities			
		Excavation / Backfill / Compaction			
		Water Line - Fire			
		Water Line - Domestic			
		Fire Department Connection			
		Testing			
	333000	Sanitary Sewer			
		Excavation / Backfill / Compaction			
		Piping			
		Manholes			
		Testing			
	334100	Storm Drainage			
		Foundation Drains			
		Excavation / Backfill / Compaction			
		Piping			
		Structures / Inlets			
		Testing			
Totals					

SECTION 013100

PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Administrative and supervisory personnel.
 - 2. Project meetings.
 - 3. Requests for Interpretation (RFIs).
 - 4. Commissioning.
- B. Each contractor shall participate in coordination requirements. Certain areas of responsibility will be assigned to a specific contractor.

1.3 DEFINITIONS

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

1.4 COORDINATION

- A. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
- B. Each contractor shall coordinate its construction operations with those of other contractors and entities to ensure efficient and orderly installation of each part of the Work. Each contractor shall coordinate its operations with operations, included in different Sections that depend on each other for proper installation, connection, and operation.
 - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
 - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
 - 3. Make adequate provisions to accommodate items scheduled for later installation.
 - 4. Where availability of space is limited, coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair of all components, including mechanical and electrical.

- C. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
 - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
 - 1. Preparation of Contractor's Construction Schedule.
 - 2. Preparation of the Schedule of Values.
 - 3. Installation and removal of temporary facilities and controls.
 - 4. Delivery and processing of submittals.
 - 5. Progress meetings.
 - 6. Preinstallation conferences.
 - 7. Project closeout activities.
 - 8. Startup and adjustment of systems.
 - 9. Project closeout activities.

- E. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
 - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

1.5 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to Project superintendent, provide other administrative and supervisory personnel as required for proper performance of the Work.
 - 1. Include special personnel required for coordination of operations with other contractors.

- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home and office telephone numbers. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.
 - 1. Post copies of list in Project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
 - 1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 - 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.

3. Minutes: Record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule a preconstruction conference before starting construction no later than 15 days after execution of the Agreement. Hold the conference at Project site or another convenient location. Conduct the meeting to review responsibilities and personnel assignments.
1. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Procedures for processing field decisions and Change Orders.
 - f. Procedures for RFIs.
 - g. Procedures for testing and inspecting.
 - h. Procedures for processing Applications for Payment.
 - i. Distribution of the Contract Documents.
 - j. Submittal procedures.
 - k. LEED requirements, if applicable.
 - l. Preparation of Record Documents.
 - m. Use of the premises and existing building, if applicable.
 - n. Work restrictions.
 - o. Owner's occupancy requirements.
 - p. Responsibility for temporary facilities and controls.
 - q. Construction waste management and recycling.
 - r. Parking availability.
 - s. Office, work, and storage areas.
 - t. Equipment deliveries and priorities.
 - u. First aid.
 - v. Security.
 - w. Progress cleaning.
 - x. Working hours.
 3. Minutes: Record and distribute meeting minutes.
- C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.
1. Attendees: 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. Advise all entities of scheduled meeting dates.
 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
 - a. The Contract Documents.
 - b. Options.
 - c. Related RFIs.
 - d. Related Change Orders.

- e. Purchases.
 - f. Deliveries.
 - g. Submittals.
 - h. Review of mockups.
 - i. Possible conflicts.
 - j. Compatibility problems.
 - k. Time schedules.
 - l. Weather limitations.
 - m. Manufacturer's written recommendations.
 - n. Warranty requirements.
 - o. Compatibility of materials.
 - p. Acceptability of substrates.
 - q. Temporary facilities and controls.
 - r. Space and access limitations.
 - s. Regulations of authorities having jurisdiction.
 - t. Testing and inspecting requirements.
 - u. Installation procedures.
 - v. Coordination with other work.
 - w. Required performance results.
 - x. Protection of adjacent work.
 - y. Protection of construction and personnel.
3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings as determined by Owner or Architect.

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

- 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Status of correction of deficient items.
 - 14) Field observations.
 - 15) RFIs.
 - 16) Status of proposal requests.
 - 17) Pending changes.
 - 18) Status of Change Orders.
 - 19) Pending claims and disputes.
 - 20) Documentation of information for payment requests.
3. Minutes: Record and distribute meeting minutes.
 4. Reporting: Distribute minutes of the meeting to each party present and to parties who should have been present.
 - a. Schedule Updating: Revise Contractor's Construction Schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.
- E. Coordination Meetings: Conduct Project coordination meetings at weekly intervals. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and preinstallation conferences.
1. Attendees: Each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 2. Agenda: Review and correct or approve minutes of the previous coordination meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Combined Contractor's Construction Schedule: Review progress since the last coordination meeting. Determine whether each contract is on time, ahead of schedule, or behind schedule, in relation to Combined Contractor's Construction Schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - b. Schedule Updating: Revise Combined Contractor's Construction Schedule after each coordination meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with report of each meeting.
 - c. Review present and future needs of each contractor present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.

- 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.
 - 9) Work hours.
 - 10) Hazards and risks.
 - 11) Progress cleaning.
 - 12) Quality and work standards.
 - 13) Change Orders.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
- a. Distribute recorded meeting results to Owner representative and the Architect.

1.7 REQUESTS FOR INTERPRETATION (RFIs)

- A. Procedure: Immediately on discovery of the need for interpretation of the Contract Documents, and if not possible to request interpretation at Project meeting, prepare and submit an RFI to the Architect.
1. RFIs shall originate with Contractor.
 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing interpretation and the following:
1. Drawing number and detail references, as appropriate.
 2. Field dimensions and conditions, as appropriate.
 3. Contractor's suggested solution(s). If Contractor's solution(s) impact the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 4. Electronic Attachments: Include drawings, descriptions, measurements, photos, Product Data, Shop Drawings, and other information necessary to fully describe items needing interpretation.
 - a. Supplementary drawings prepared by Contractor shall include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments.
- C. RFI Format:
1. Electronically submit all RFIs thru the Architect's Project Management System.
 2. Attachments shall be uploaded and attached to the RFI prepared by the Contractor via the Architect's Project Management System with attachments.
- D. Architect's Action: Architect will review each RFI, determine action required, and return it. Allow five working days minimum for Architect's response for each RFI. RFIs received after 1:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.

- d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Requests for electronic files (CAD, PDF, etc.)
 - g. Incomplete RFIs or RFIs with numerous errors.
2. Architect's action may include a request for additional information, in which case Architect's time for response will start again.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within the time frame indicated in the General Conditions.
- E. On receipt of Architect's action, immediately distribute the RFI response to affected parties. Review response and notify Architect within three days if Contractor disagrees with response.
- F. RFI Log: All open and closed RFIs will be logged via the Architect's Project Management Software and available for viewing by all Project Team Members.

1.8 COMMISSIONING

- A. Contractor shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
1. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend correction action.
 2. Cooperate with the CxA for resolution of issues recorded in the Issues Log.
 3. Attend commissioning team meetings.
 4. Integrate and coordinate commissioning process activities with construction schedule.
 5. Review and accept construction checklists provided by the CxA.
 6. Complete construction checklists provided by the CxA.
 7. Complete construction checklists as Work is completed and provided to the Commissioning Authority.
 8. Review and accept commissioning process test procedures provided by the Commissioning Authority.
 9. Complete commissioning process test procedures.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

REQUEST FOR INFORMATION

R.F.I. NO. _____

Project: Steubenville City Schools **Project No.** 21042.000
Steubenville High School STEM Building

Architect: Hasenstab Architects, Inc. **Date Requested:** _____
Tel: (330) 434-4464, Fax: (330) 434-8546 **Info Needed By:** _____

From: **Copies To:**

Name _____	Name _____
Company _____	Company _____
	Name _____
	Company _____

Information Requested:

References: **Spec Section** _____ **Drawing No.** _____ **Detail No.** _____

Attachments: _____

Date Received: _____

Response: _____

Reviewed By: _____ **Date:** _____

Attachments: _____

31-Jul

SECTION 013110
COORDINATION DRAWINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing, submitting, and approving Coordination Drawings.

1.3 DEFINITIONS

- A. Designated Contractor: Contractor identified as the contractor responsible for preparation of the final coordination drawings based on information from all other contractors and coordination participants.
 - 1. The Designated Contractor for this project is the Mechanical Contractor.
- B. Coordination Participant: Contractors, Subcontractors and material suppliers whose work is relevant to the preparation of the final coordination drawings.

1.4 RELATED SECTIONS

- A. Record documents.

1.5 COORDINATION MEETINGS

- A. The Project Coordinator shall schedule and conduct coordination meetings for all Separate Contractors and appropriate Subcontractors and Material Suppliers (“Coordination Participants”).
 - 1. The purpose of the coordination meetings is to discuss the sequence of construction and its relationship with the approved Construction Progress Schedule; to establish the intended location of equipment, pipe, duct, conduit, and other components of the Project; and to coordinate the appropriate shared use of available construction space; especially interstitial spaces, chases and mechanical rooms; and construction storage space.
 - 2. Each Coordination Participant shall be knowledgeable about the Project and the scope of its work. One individual from each Coordination Participant shall have authority to make decisions regarding the coordination process and drawings.
 - 3. Each Coordination Participant shall come to the coordination meetings prepared to demonstrate and furnish documentation that it has anticipated the work of other Persons, and

- planned its installation. Each Coordination Participant shall coordinate its installation with the work of other persons.
4. Each Coordination Participant shall utilize documentation and information provided by other Coordination Participants to verify that the utility requirements, physical size and characteristics of planned equipment are compatible with related or connected equipment, existing or planned building components, and existing or planned utilities.
 5. The Coordination Participants shall utilize the documentation and information provided by each of them in determining the actual placement and positioning of equipment and devices to avoid interference with the work of other Persons, building finishes and architectural details.
 6. The Coordination Participants shall utilize the documentation and information provided by each of them to coordinate space requirements and installation considerations to maximize accessibility to equipment and devices for purposes of maintenance, repairs and replacement.
 7. The Project Coordinator shall prepare a written report of each coordination meeting and distribute the report within 3 business days of the meeting to the Architect and other Coordination Participants.

1.6 COORDINATION DRAWINGS

- A. Prepare coordination drawings to a scale of ¼ inch equals 1 foot 0 inch or larger, with BIM or CAD software, detailing major elements, components and systems of mechanical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where sequencing and coordination of installations are of importance to the efficient flow of the Work, including (but not necessarily limited to) the following:
1. Indicate the proposed location of piping, ductwork, equipment and materials. Include the following:
 - a. Clearances for installation and maintaining insulation.
 - b. Clearances for servicing and maintaining equipment, including filter removal, and space for equipment disassembly required for periodic maintenance.
 - c. Equipment connections and support details.
 - d. Exterior wall, roof and foundation penetrations.
 - e. Fire-rated wall and floor penetrations.
 - f. Sizes and locations of required concrete pads and bases.
 - g. Planned piping layout, including valve and specialty locations and valve stem movement.
 - h. Location and size of access doors required for access to concealed dampers, valves, and other controls.
 - i. Planned duct systems layout, including elbow radii and duct accessories.
 - j. Clearances for servicing and maintaining equipment, including space for equipment disassembly required for periodic maintenance.
 - k. Equipment service connections and support details.
 2. Indicate scheduling sequencing, movement and positioning of large equipment into or on the building during construction.
 3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
 4. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communication systems components, sprinklers and other ceiling mounted items.
 5. Coordinate electrical and mechanical requirements of equipment. Provide necessary changes to comply with manufacturer's requirements.

6. Construction documents are diagrammatic. Contractor shall coordinate and provide changes to accommodate minor relocation of equipment

1.7 DRAWING PROCESS

- A. Provide Preliminary Coordination Drawings to all Coordination Participants. Each Coordination Participant shall use the Preliminary Coordination Drawings as a baseline to develop drawings of its work within each applicable Coordination Area.
 1. Specifically locate equipment, devices, piping, conduits and other work as described and agreed at the coordination meetings.
- B. Each Coordination Participant with work within a Coordination Area shall return its drawings to the Contractor marked to show the location of the Coordination Participant's items.
 1. Show location of equipment, devices, piping, conduits, and other work for the Contractor's preparation of detailed and final coordination drawings ("Coordination Drawings").
- C. Any Coordination Participant with no work in any Coordination Area may return the applicable Preliminary Coordination Drawings to the Contractor with a statement on the drawings signed by an authorized representative of the Coordination Participant certifying that it has no work within that Coordination Area.
- D. The Designated Contractor shall consolidate the information for use as the final coordination drawings.
- E. After the Designated Contractor completes the Coordination Drawings, the designated Contractor shall forward a copy of the Coordination Drawings to the Coordination Participants with work within the limits of a Coordination Area and all other contractors. Submit a copy to the Architect for record purposes.
- F. Upon completion of the work, electronically update the coordination drawings with all changes associated with Construction Change Directives, Proposal Requests, Request for Information, or any other as-built revisions that have occurred throughout the duration of the project. Refer to the Project Record Documents section for submission of coordination drawings as Project Record Documents.

1.8 APPROVAL

- A. Each Participating contractor involved must sign off on final Coordination Drawings. This Signature indicates the participating contractor has reviewed and accepted the Coordination Drawings and shall complete installation as indicated on the Coordination Drawings.
- B. After Contractor's written Approval of Coordination Drawings, Contractors and all participants shall be responsible for resolving conflicts and determining the method used to resolve interferences not previously identified.
- C. Modifications required as a result of failure to resolve interferences, shall be paid for by the responsible Contractor.
- D. One (1) copy of current approved Coordination Drawings at Project Site.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION

SECTION 013200

CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
 - 1. Contractor's construction schedule.
 - 2. Construction schedule updating reports.
 - 3. Daily construction reports.
 - 4. Site condition reports.
 - 5. Special reports.
- B. Related Requirements:
 - 1. Division 01 Section "Multiple Contract Summary" for preparing a combined Contractor's construction schedule when applicable.
 - 2. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 DEFINITIONS

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
 - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
 - 2. Predecessor Activity: An activity that precedes another activity in the network.
 - 3. Successor Activity: An activity that follows another activity in the network.
- B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.
- C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.
- D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

- E. Event: The starting or ending point of an activity.
- F. Float: The measure of leeway in starting and completing an activity.
 - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
 - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
 - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 SUBMITTALS

- A. Format for Submittals: Submit required submittals in the following format:
 - 1. Two paper copies.
- B. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
- C. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
 - 1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
 - 2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
 - 3. Total Float Report: List of all activities sorted in ascending order of total float.
 - 4. Earnings Report: Compilation of Contractor's total earnings from the Notice to Proceed until most recent Application for Payment.
- D. Construction Schedule Updating Reports: Submit with Applications for Payment and as required to reflect an accurate account of the construction activities.
- E. Daily Construction Reports: Submit when requested by Architect or Owner.
- F. Site Condition Reports: Submit at time of discovery of differing conditions.
- G. Special Reports: Submit at time of unusual event.

1.5 QUALITY ASSURANCE

- A. Scheduling Consultant Qualifications: An experienced specialist in CPM scheduling and reporting, with capability of producing CPM reports and diagrams within 24 hours of Architect's request.
- B. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures

related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:

1. Review software limitations and content and format for reports.
2. Verify availability of qualified personnel needed to develop and update schedule.
3. Discuss constraints, including phasing, work stages, area separations, interim milestones and partial Owner occupancy.
4. Review delivery dates for Owner-furnished products.
5. Review schedule for work of Owner's separate contracts.
6. Review submittal requirements and procedures.
7. Review time required for review of submittals and resubmittals.
8. Review requirements for tests and inspections by independent testing and inspecting agencies.
9. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
10. Review and finalize list of construction activities to be included in schedule.
11. Review procedures for updating schedule.

1.6 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests, and other required schedules and reports.
 1. Secure time commitments for performing critical elements of the Work from entities involved.
 2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice of Award to date of final completion.
 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
 1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
 2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
 3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
 4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.

5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
 6. Punch List and Final Completion: Include not more than 30 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
 2. Work under More Than One Contract: Include a separate activity for each contract.
 3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
 4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
 6. Work Restrictions: Show the effect of the following items on the schedule:
 - a. Coordination with existing construction.
 - b. Limitations of continued occupancies.
 - c. Uninterruptible services.
 - d. Partial occupancy before Substantial Completion.
 - e. Use of premises restrictions.
 - f. Provisions for future construction.
 - g. Seasonal variations.
 - h. Environmental control.
 7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
 - a. Subcontract awards.
 - b. Submittals.
 - c. Purchases.
 - d. Mockups.
 - e. Fabrication.
 - f. Sample testing.
 - g. Deliveries.
 - h. Installation.
 - i. Tests and inspections.
 - j. Adjusting.
 - k. Curing.
 - l. Building flush-out.
 - m. Startup and placement into final use and operation.
 8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
 - a. Structural completion.
 - b. Temporary enclosure and space conditioning.
 - c. Permanent space enclosure.
 - d. Completion of mechanical installation.
 - e. Completion of electrical installation.

f. Substantial Completion.

- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion, and the following interim milestones:
 - 1. Temporary enclosure and space conditioning.
- E. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.
- F. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

- A. Utilize Gantt-Chart schedule for smaller and less complex projects only when approved by Architect.
- B. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for commencement of the Work. Base schedule on the startup construction schedule and additional information received since the start of Project.
- C. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
 - 1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using AON (activity-on-node) format.
- B. Startup Network Diagram: When requested, submit diagram within 14 days of date established for commencement of the Work. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.
 - 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for commencement of the Work.
 - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.

2. Conduct educational workshops to train and inform key Project personnel, including subcontractors' personnel, in proper methods of providing data and using CPM schedule information.
 3. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
 4. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- D. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
 - a. Preparation and processing of submittals.
 - b. Mobilization and demobilization.
 - c. Purchase of materials.
 - d. Delivery.
 - e. Fabrication.
 - f. Utility interruptions.
 - g. Installation.
 - h. Work by Owner that may affect or be affected by Contractor's activities.
 - i. Testing and commissioning.
 - j. Punch list and final completion.
 - k. Activities occurring following final completion.
 2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
 3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
 4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
 - a. Subnetworks on separate sheets are permissible for activities clearly off the critical path.
- E. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
 2. Description of activity.
 3. Main events of activity.
 4. Immediate preceding and succeeding activities.
 5. Early and late start dates.
 6. Early and late finish dates.
 7. Activity duration in workdays.
 8. Total float or slack time.
 9. Average size of workforce.
 10. Dollar value of activity (coordinated with the schedule of values).

- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
 2. Changes in early and late start dates.
 3. Changes in early and late finish dates.
 4. Changes in activity durations in workdays.
 5. Changes in the critical path.
 6. Changes in total float or slack time.
 7. Changes in the Contract Time.
- H. Value Summaries: Prepare two cumulative value lists, sorted by finish dates.
1. In first list, tabulate activity number, early finish date, dollar value, and cumulative dollar value.
 2. In second list, tabulate activity number, late finish date, dollar value, and cumulative dollar value.
 3. In subsequent issues of both lists, substitute actual finish dates for activities completed as of list date.
 4. Prepare list for ease of comparison with payment requests; coordinate timing with progress meetings.
 - a. In both value summary lists, tabulate "actual percent complete" and "cumulative value completed" with total at bottom.

2.4 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
 2. List of separate contractors at Project site.
 3. Approximate count of personnel at Project site.
 4. Equipment at Project site.
 5. Material deliveries.
 6. High and low temperatures and general weather conditions, including presence of rain or snow.
 7. Accidents.
 8. Meetings and significant decisions.
 9. Unusual events (see special reports).
 10. Stoppages, delays, shortages, and losses.
 11. Meter readings and similar recordings.
 12. Emergency procedures.
 13. Orders and requests of authorities having jurisdiction.
 14. Change Orders received and implemented.
 15. Construction Change Directives received and implemented.
 16. Services connected and disconnected.
 17. Equipment or system tests and startups.
 18. Partial completions and occupancies.
 19. Substantial Completions authorized.
- B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

2.5 SPECIAL REPORTS

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

PART 3 - EXECUTION

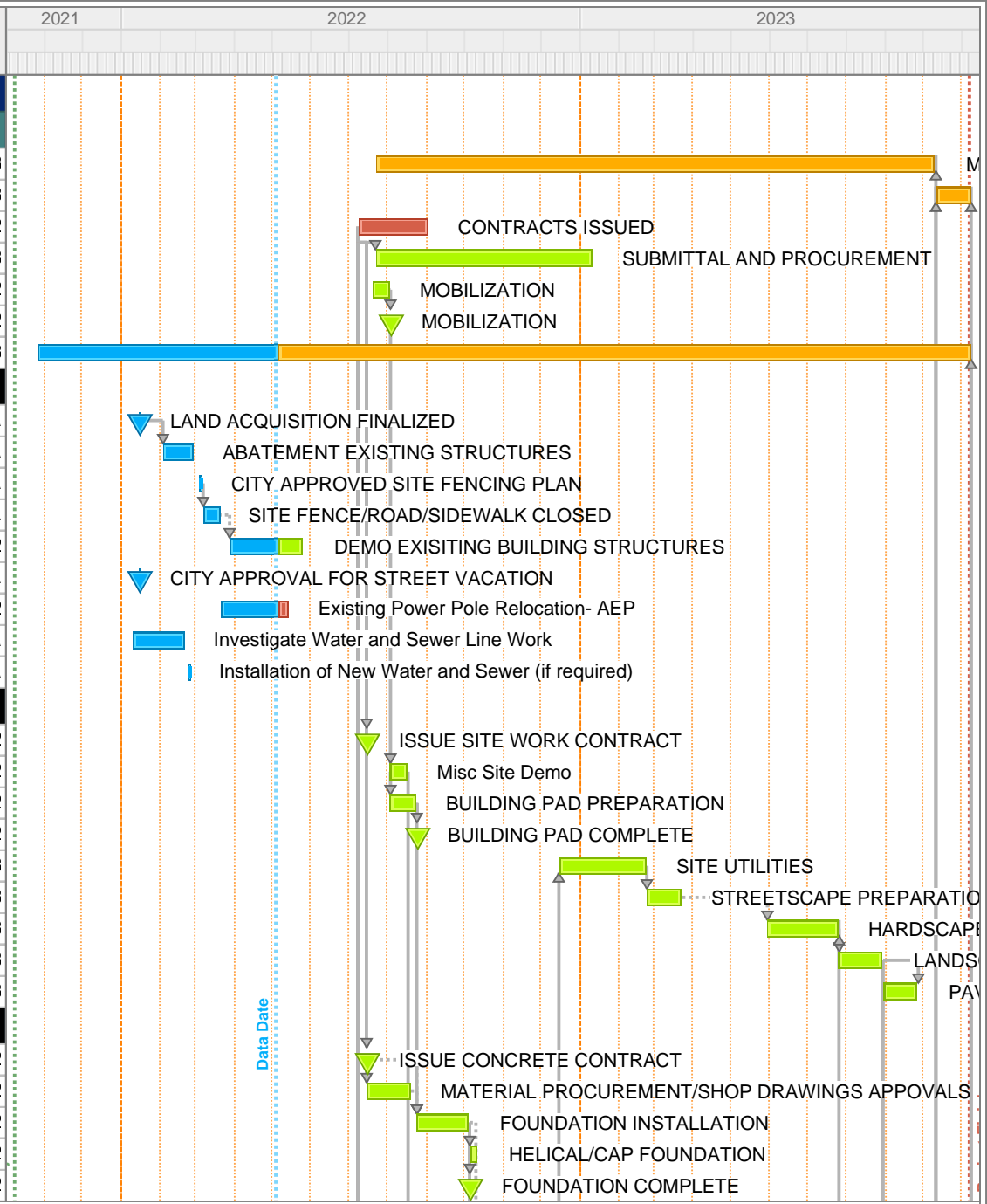
3.1 CONSTRUCTION SCHEDULE

- A. Prior to first application for payment, each Contractor must meet with the construction manager for scheduling meetings. Each Contractor will be required to provide information to the projects schedule. The construction manager will issue a bid of the Construction Progress Schedule to all Contractors for their signature showing that they are in acceptance of the schedule. Each month the Contractors will be required to sign off indicating their understanding and acceptance of the updated schedule. Failure to provide signatures may result in withholding of Contractor payments and/or associated liquidated damages to each sub as they become deficient. Additionally, each Contractor must provide written acceptance of the construction schedule.
- B. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.
 - 1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
 - 2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.
 - 3. As the Work progresses, indicate final completion percentage for each activity.
- C. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.
 - 1. Post copies in Project meeting rooms and temporary field offices.
 - 2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.
- A. Schedule Preparation
 - 1. Monthly schedule updates will be prepared by the Project Coordinator. Contractors are to update their individual schedules as indicated and cooperate with all other contractors in the preparation of the comprehensive project schedule prepared by the Project Coordinator.
- B. Schedule Coordination
 - 1. The Contractor, immediately after being awarded the Contract, shall prepare Construction Schedule for his Work, which shall provide for expeditious and practicable execution of the Work in accordance with the indicated project timeframe. The comprehensive construction

- schedule approved by all Contractors, shall be submitted within 15 days from date of commencement.
2. Each Contractor agrees to work with the Project Coordinator to finalize the comprehensive Construction Schedule and agree that the judgments made by the Project Coordinator are in the best interest of the Project and will not be cause for additional compensation. The completion timeframe shall be per the indicated project timeframe.
 3. Each Contractor shall adhere to the comprehensive Construction Schedule and shall carry on the Work promptly and efficiently without delaying other portions of Work. If necessary, to facilitate the overall schedule, certain parts of the Work shall be performed in preference to others.
 4. If the Contractor falls behind schedule with Work, the Contractor shall, at his own expense, work such overtime or take other corrective action as may be necessary to get back on schedule and to complete the Work. Any resulting costs or damages are the responsibility of the Contractor causing the delay.

END OF SECTION

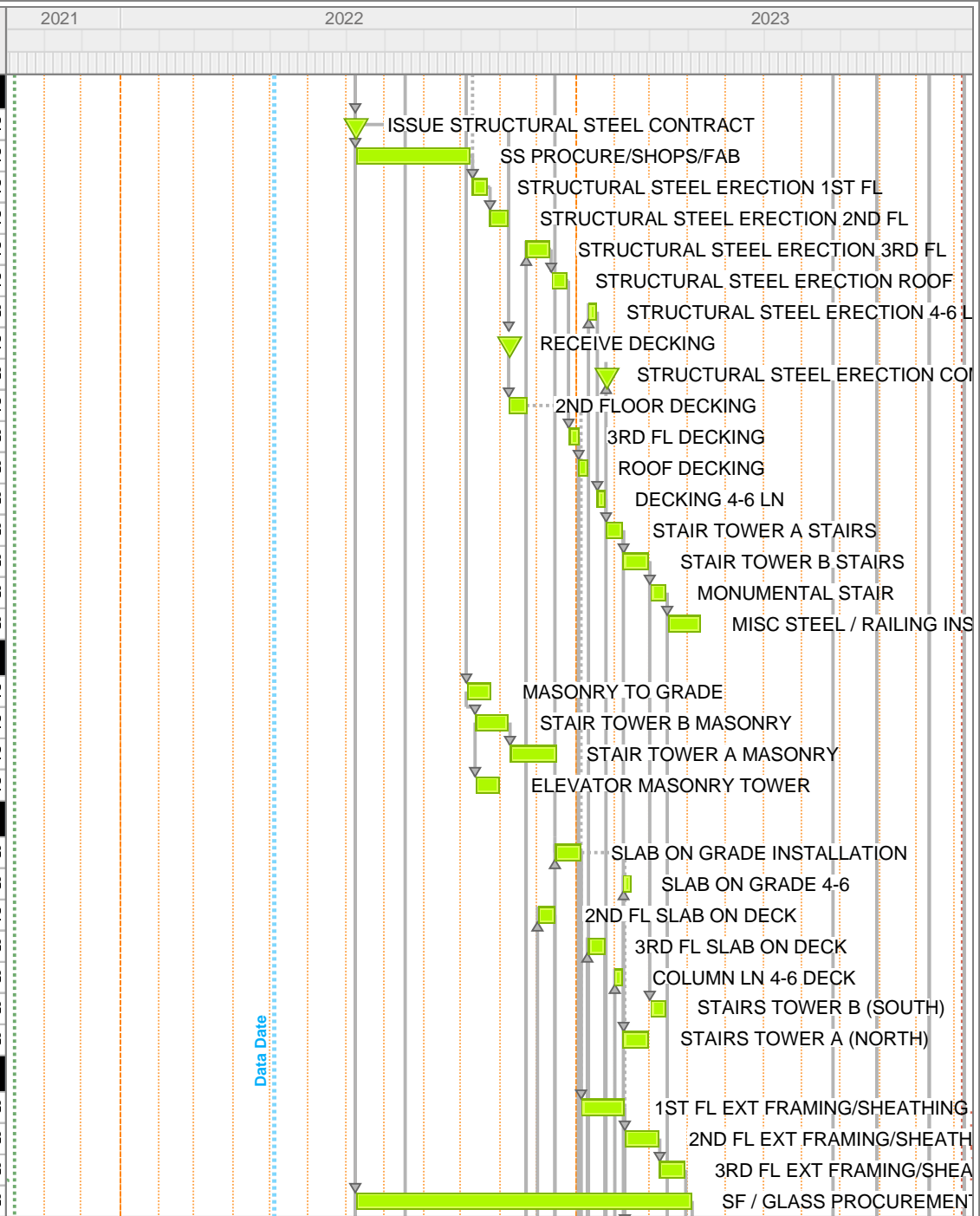
ID	Description	Original Duration	Start	Finish
Steuenville STEM Facility				
Construction				
CON-01	MOBILIZATION TO SUBSTANTIAL COM	315	07/22/22	10/10/23
CON-02	SUBSTANTIAL COMPLETION TO FINAL	20	10/11/23	11/07/23
CON-10	CONTRACTS ISSUED	40	07/08/22	09/01/22
CON-30	SUBMITTAL AND PROCUREMENT	120	07/22/22	01/09/23
CON-50	MOBILIZATION	10	07/19/22	08/01/22
CON-60	MOBILIZATION	0		08/02/22
CON-61	Duration	524	10/26/21A	11/07/23
Demo / Utility Relocation- By Owner				
CON-62	LAND ACQUISITION FINALIZED	0		01/14/22A
CON-63	ABATEMENT EXISTING STRUCTURES	15	02/03/22A	02/25/22A
CON-63.2	CITY APPROVED SITE FENCING PLAN	1	03/04/22A	03/04/22A
CON-63.5	SITE FENCE/ROAD/SIDEWALK CLOSE	10	03/07/22A	03/18/22A
CON-64	DEMO EXISITING BUILDING STRUCTUF	15	03/28/22A	05/25/22
CON-65	CITY APPROVAL FOR STREET VACATI	0		01/14/22A
CON-66	Existing Power Pole Relocation- AEP	40	03/21/22A	05/13/22
CON-67	Investigate Water and Sewer Line Work	25	01/10/22A	02/18/22A
CON-68	Installation of New Water and Sewer (if re	35	02/23/22A	02/23/22A
Sitework				
CON-69	ISSUE SITE WORK CONTRACT	0		07/14/22
CON-70	Misc Site Demo	10	08/03/22	08/16/22
CON-90	BUILDING PAD PREPARATION	15	08/03/22	08/23/22
CON-100	BUILDING PAD COMPLETE	0		08/23/22
CON-110	SITE UTILITIES	50	12/15/22	02/22/23
CON-130	STREETSCAPE PREPARATION	20	02/23/23	03/22/23
CON-170	HARDSCAPE INSTALLATION	40	05/30/23	07/25/23
CON-190	LANDSCAPING INSTALLATION	25	07/26/23	08/29/23
CON-210	PAVING INSTALLATION	20	08/30/23	09/26/23
Foundation				
CON-229	ISSUE CONCRETE CONTRACT	0		07/14/22
CON-229.5	MATERIAL PROCUREMENT/SHOP DRA	25	07/15/22	08/18/22
CON-230	FOUNDATION INSTALLATION	30	08/24/22	10/04/22
CON-235	HELICAL/CAP FOUNDATION	5	10/05/22	10/11/22
CON-240	FOUNDATION COMPLETE	0		10/04/22



Steuenville STEM Building CMR Design Schedule



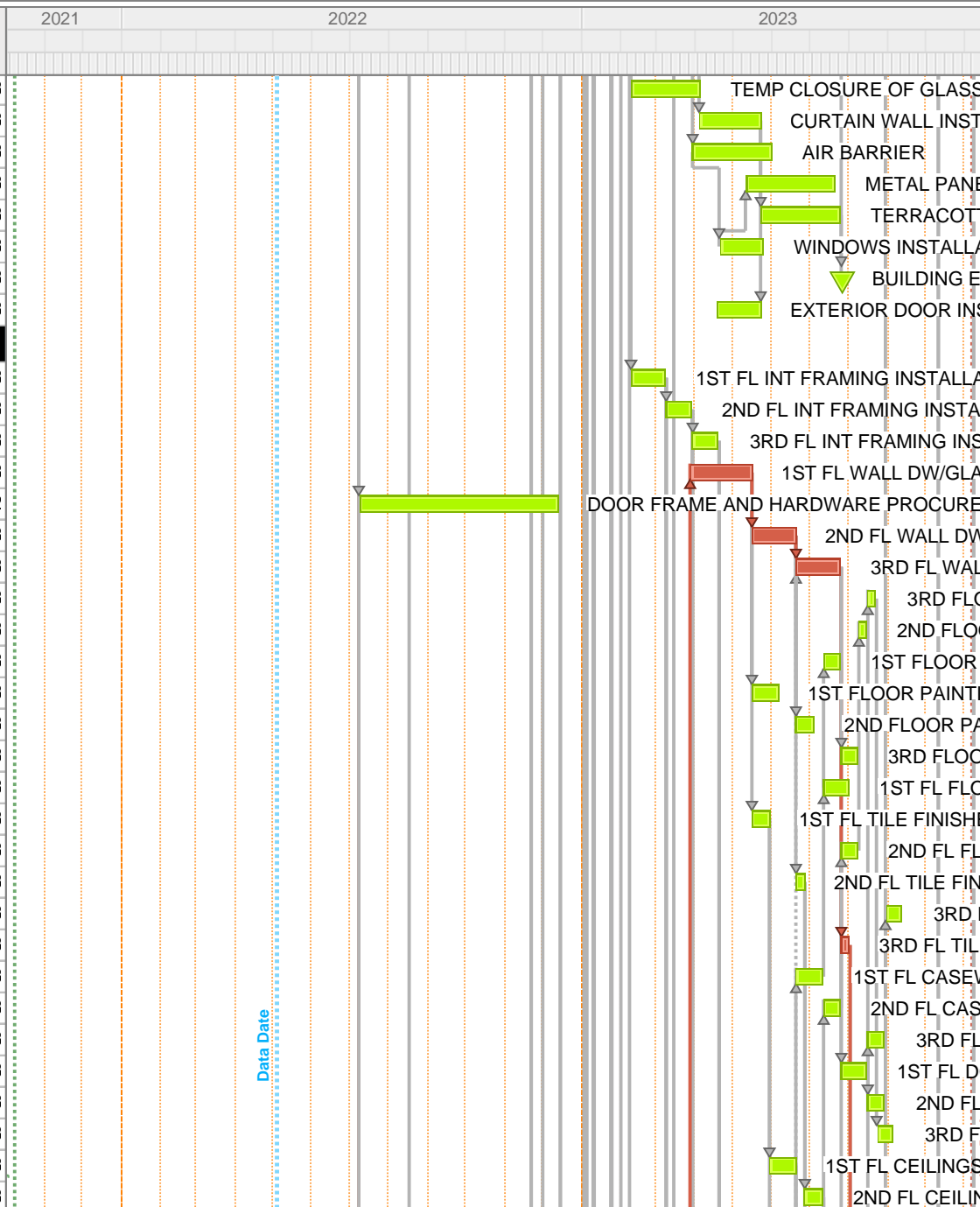
ID	Description	Original Duration	Start	Finish
Structural				
CON-409	ISSUE STRUCTURAL STEEL CONTRAC	0		07/07/22
CON-409.5	SS PROCURE/SHOPS/FAB	66	07/08/22	10/07/22
CON-410	STRUCTURAL STEEL ERECTION 1ST F	10	10/10/22	10/21/22
CON-412	STRUCTURAL STEEL ERECTION 2ND F	12	10/24/22	11/08/22
CON-413	STRUCTURAL STEEL ERECTION 3RD F	12	11/22/22	12/09/22
CON-414	STRUCTURAL STEEL ERECTION ROOF	10	12/12/22	12/23/22
CON-417	STRUCTURAL STEEL ERECTION 4-6 LN	5	01/11/23	01/17/23
CON-418	RECEIVE DECKING	0		11/07/22
CON-420	STRUCTURAL STEEL ERECTION COMF	0		01/24/23
CON-455	2ND FLOOR DECKING	10	11/08/22	11/21/22
CON-460	3RD FL DECKING	6	12/26/22	01/02/23
CON-470	ROOF DECKING	6	01/03/23	01/10/23
CON-475	DECKING 4-6 LN	5	01/18/23	01/24/23
CON-480	STAIR TOWER A STAIRS	10	01/25/23	02/07/23
CON-485	STAIR TOWER B STAIRS	15	02/08/23	02/28/23
CON-487	MONUMENTAL STAIR	10	03/01/23	03/14/23
CON-490	MISC STEEL / RAILING INSTALLATION	20	03/15/23	04/11/23
Masonry				
CON-499	MASONRY TO GRADE	15	10/05/22	10/25/22
CON-500	STAIR TOWER B MASONRY	20	10/12/22	11/08/22
CON-505	STAIR TOWER A MASONRY	25	11/09/22	12/15/22
CON-510	ELEVATOR MASONRY TOWER	15	10/12/22	11/01/22
Concrete				
CON-590	SLAB ON GRADE INSTALLATION	15	12/15/22	01/04/23
CON-600	SLAB ON GRADE 4-6	5	02/08/23	02/14/23
CON-630	2ND FL SLAB ON DECK	10	12/01/22	12/14/22
CON-640	3RD FL SLAB ON DECK	10	01/10/23	01/23/23
CON-645	COLUMN LN 4-6 DECK	5	02/01/23	02/07/23
CON-650	STAIRS TOWER B (SOUTH)	10	03/01/23	03/14/23
CON-660	STAIRS TOWER A (NORTH)	15	02/08/23	02/28/23
Framing / Sheathing				
CON-730	1ST FL EXT FRAMING/SHEATHING	25	01/05/23	02/08/23
CON-750	2ND FL EXT FRAMING/SHEATHING	20	02/09/23	03/08/23
CON-770	3RD FL EXT FRAMING/SHEATHING	15	03/09/23	03/29/23
CON-770.25	SF / GLASS PROCUREMENT / SHOP / C	190	07/08/22	04/03/23



Stevensville STEM Building CMR Design Schedule



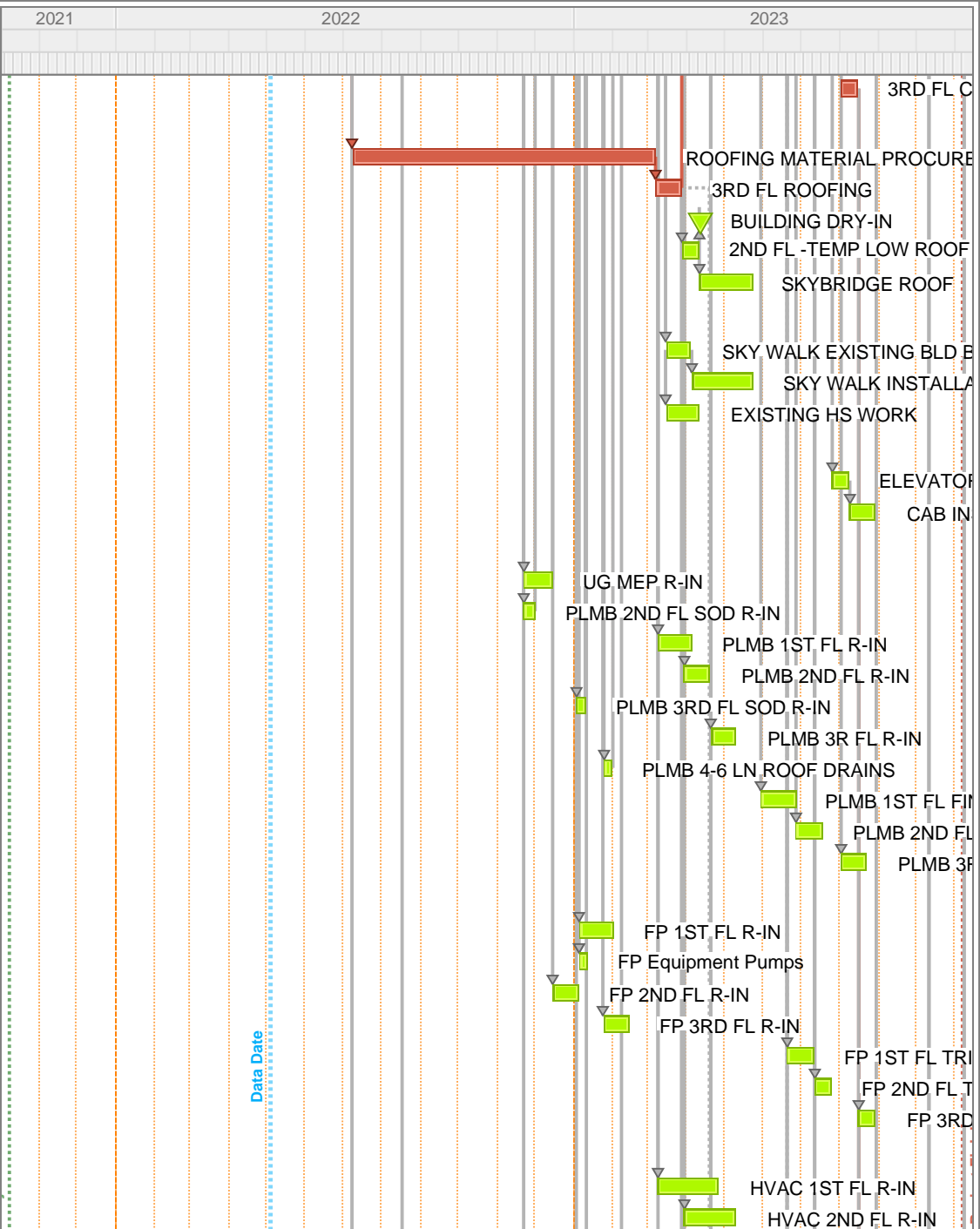
ID	Description	Original Duration	Start	Finish
CON-770.35	TEMP CLOSURE OF GLASS OPENINGS	40	02/09/23	04/05/23
CON-771	CURTAIN WALL INSTALLATION	35	04/04/23	05/22/23
CON-772	AIR BARRIER	45	03/30/23	05/31/23
CON-773	METAL PANEL INSTALLATION	50	05/11/23	07/20/23
CON-774	TERRACOTTA TILE INSTALLATION	45	05/23/23	07/25/23
CON-780	WINDOWS INSTALLATION	25	04/20/23	05/24/23
CON-800	BUILDING ENCLOSURE COMPLETE	0		07/25/23
CON-820	EXTERIOR DOOR INSTALLATION	25	04/18/23	05/22/23
Interior				
CON-830	1ST FL INT FRAMING INSTALLATION	20	02/09/23	03/08/23
CON-850	2ND FL INT FRAMING INSTALLATION	15	03/09/23	03/29/23
CON-870	3RD FL INT FRAMING INSTALLATION	15	03/30/23	04/19/23
CON-890	1ST FL WALL DW/GLASS WALLS	35	03/28/23	05/15/23
CON-900	DOOR FRAME AND HARDWARE PROCURE	110	07/08/22	12/12/22
CON-910	2ND FL WALL DW/GLASS WALLS	25	05/16/23	06/19/23
CON-930	3RD FL WALL DW/GLASS WALLS	25	06/20/23	07/25/23
CON-931	3RD FLOOR CONCRETE POLISHING	5	08/16/23	08/22/23
CON-931.2	2ND FLOOR CONCRETE POLISHING	5	08/09/23	08/15/23
CON-931.5	1ST FLOOR CONCRETE POLISHING	10	07/12/23	07/25/23
CON-932	1ST FLOOR PAINTING	15	05/16/23	06/05/23
CON-934	2ND FLOOR PAINTING	10	06/20/23	07/03/23
CON-936	3RD FLOOR PAINTING	10	07/26/23	08/08/23
CON-940	1ST FL FLOORING	15	07/12/23	08/01/23
CON-942	1ST FL TILE FINISHES	10	05/16/23	05/29/23
CON-945	2ND FL FLOORING	10	07/26/23	08/08/23
CON-946	2ND FL TILE FINISHES	5	06/20/23	06/26/23
CON-947	3RD FL FLOORING	10	08/30/23	09/12/23
CON-947.2	3RD FL TILE FINISHES	5	07/26/23	08/01/23
CON-948	1ST FL CASEWORK/MISC	15	06/20/23	07/11/23
CON-949	2ND FL CASEWORK/MISC	10	07/12/23	07/25/23
CON-960	3RD FL CASEWORK/MISC	10	08/16/23	08/29/23
CON-965	1ST FL DOOR/HARDWARE INSTALL	15	07/26/23	08/15/23
CON-967	2ND FL DOOR/HARDWARE INSTALL	10	08/16/23	08/29/23
CON-968	3RD FL DOOR/HARDWARE INSTALL	10	08/23/23	09/05/23
CON-969	1ST FL CEILINGS	15	05/30/23	06/19/23
CON-980	2ND FL CEILINGS	10	06/27/23	07/11/23



Stebenville STEM Building CMR Design Schedule



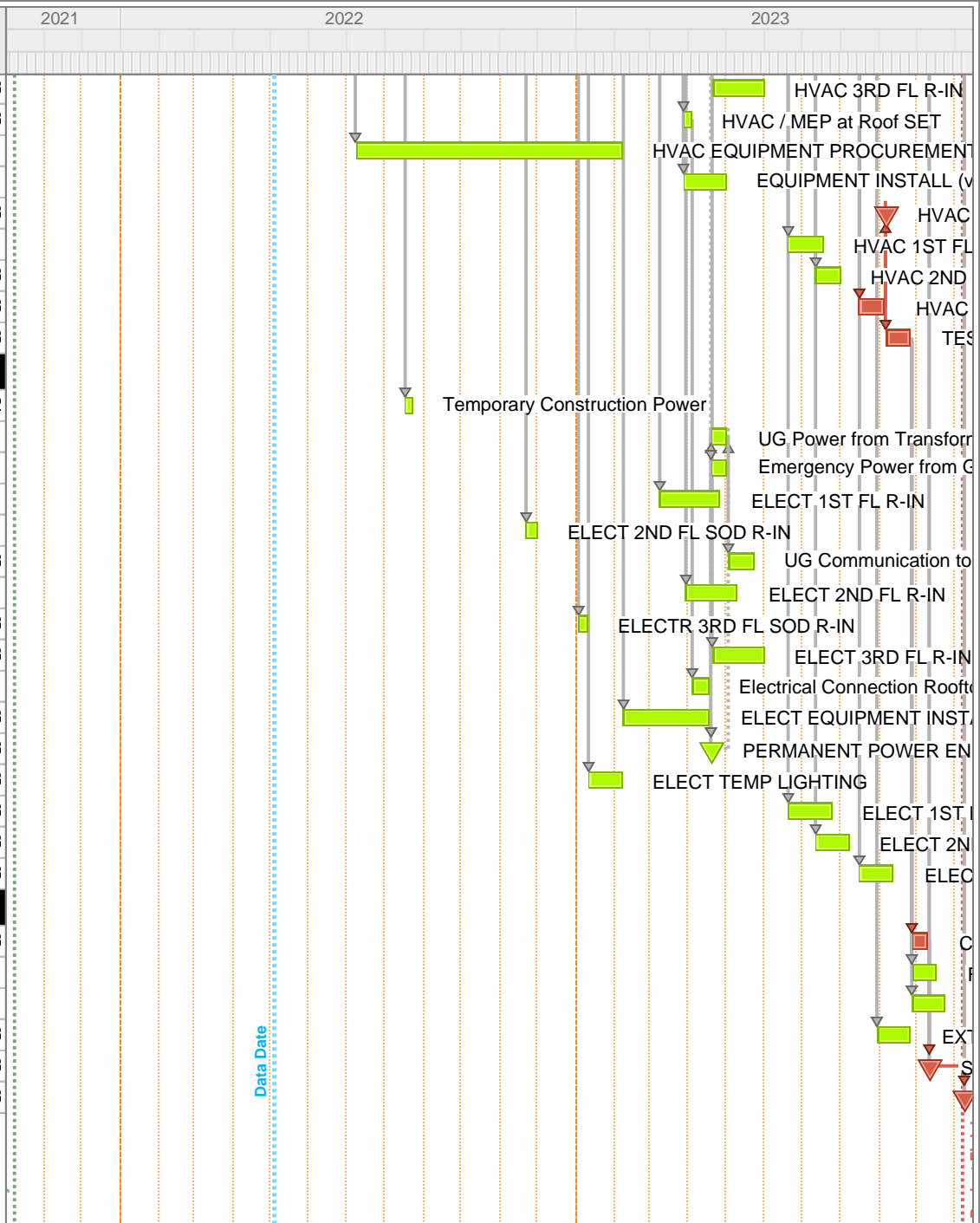
ID	Description	Original Duration	Start	Finish
CON-985	3RD FL CEILINGS	10	08/02/23	08/15/23
Roofing				
CON-949.5	ROOFING MATERIAL PROCUREMENT	170	07/08/22	03/06/23
CON-950	3RD FL ROOFING	15	03/07/23	03/27/23
CON-955	BUILDING DRY-IN	0		04/10/23
CON-970	2ND FL -TEMP LOW ROOF (4/6LN)	10	03/28/23	04/10/23
CON-975	SKYBRIDGE ROOF	30	04/11/23	05/22/23
Connector Bridge				
CON-1000	SKY WALK EXISTING BLD BRIDGE PRE	15	03/15/23	04/04/23
CON-1010	SKY WALK INSTALLATION	35	04/05/23	05/23/23
CON-1020	EXISTING HS WORK	20	03/15/23	04/11/23
Elevator				
CON-1060	ELEVATOR EQUIPMENT INSTALL	10	07/26/23	08/08/23
CON-1062	CAB INSTALLATION	15	08/09/23	08/29/23
Plumbing				
CON-1065	UG MEP R-IN	15	11/22/22	12/14/22
CON-1067	PLMB 2ND FL SOD R-IN	5	11/22/22	11/30/22
CON-1070	PLMB 1ST FL R-IN	20	03/09/23	04/05/23
CON-1090	PLMB 2ND FL R-IN	15	03/30/23	04/19/23
CON-1100	PLMB 3RD FL SOD R-IN	5	01/03/23	01/09/23
CON-1110	PLMB 3R FL R-IN	15	04/20/23	05/10/23
CON-1120	PLMB 4-6 LN ROOF DRAINS	5	01/25/23	01/31/23
CON-1130	PLMB 1ST FL FINISHES	20	05/30/23	06/26/23
CON-1150	PLMB 2ND FL FINISHES	15	06/27/23	07/18/23
CON-1170	PLMB 3RD FL FINISHES	15	08/02/23	08/22/23
Fire Protection				
CON-1190	FP 1ST FL R-IN	20	01/05/23	02/01/23
CON-1200	FP Equipment Pumps	5	01/05/23	01/11/23
CON-1210	FP 2ND FL R-IN	15	12/15/22	01/04/23
CON-1230	FP 3RD FL R-IN	15	01/24/23	02/13/23
CON-1250	FP 1ST FL TRIMOUT	15	06/20/23	07/11/23
CON-1270	FP 2ND FL TRIMOUT	10	07/12/23	07/25/23
CON-1290	FP 3RD FL TRIMOUT	10	08/16/23	08/29/23
HVAC				
CON-1310	HVAC 1ST FL R-IN	35	03/09/23	04/26/23
CON-1330	HVAC 2ND FL R-IN	30	03/30/23	05/10/23



Steubenville STEM Building CMR Design Schedule



ID	Description	Original Duration	Start	Finish
CON-1350	HVAC 3RD FL R-IN	30	04/20/23	05/31/23
CON-1360	HVAC / MEP at Roof SET	5	03/28/23	04/03/23
CON-1365	HVAC EQUIPMENT PROCUREMENT	150	07/08/22	02/06/23
CON-1370	EQUIPMENT INSTALL (vav/rtu)	25	03/28/23	05/01/23
CON-1375	HVAC SYSTEM STARTUP	0		09/05/23
CON-1377	HVAC 1ST FL TRIMOUT	20	06/20/23	07/18/23
CON-1378	HVAC 2ND FL TRIMOUT	15	07/12/23	08/01/23
CON-1379	HVAC 3RD FL TRIMOUT	15	08/16/23	09/05/23
CON-1380	TESTING/BALANCING/IAQ TESTING	15	09/06/23	09/26/23
Electrical				
CON-1382	Temporary Construction Power	5	08/17/22	08/23/22
CON-1386	UG Power from Transformer	10	04/19/23	05/02/23
CON-1388	Emergency Power from Generator	10	04/19/23	05/02/23
CON-1390	ELECT 1ST FL R-IN	35	03/09/23	04/26/23
CON-1395	ELECT 2ND FL SOD R-IN	5	11/22/22	11/30/22
CON-1400	UG Communication to existing bldg	15	05/03/23	05/23/23
CON-1410	ELECT 2ND FL R-IN	30	03/30/23	05/10/23
CON-1415	ELECTR 3RD FL SOD R-IN	5	01/03/23	01/09/23
CON-1420	ELECT 3RD FL R-IN	30	04/20/23	05/31/23
CON-1425	Electrical Connection Rooftop Equipment	10	04/04/23	04/17/23
CON-1430	ELECT EQUIPMENT INSTALL	50	02/08/23	04/18/23
CON-1440	PERMANENT POWER ENERGIZED	0		04/18/23
CON-1450	ELECT TEMP LIGHTING	20	01/11/23	02/07/23
CON-1470	ELECT 1ST FL LIGHTING/TRIMOUT	25	06/20/23	07/25/23
CON-1490	ELECT 2ND FL LIGHTING/TRIMOUT	20	07/12/23	08/08/23
CON-1510	ELECT 3RD FL LIGHTING/TRIMOUT	20	08/16/23	09/12/23
Completion				
CON-1517	COMMISSIONING	10	09/27/23	10/10/23
CON-1517.5	FINAL CLEANING	15	09/27/23	10/17/23
CON-1518	BUILDING PUNCHLIST	20	09/27/23	10/24/23
CON-1519	EXTERIOR/STREETSCAPE PUNCHLIST	20	08/30/23	09/26/23
CON-1520	SUBSTANTIAL COMPLETION	0		10/10/23
CON-1530	FINAL COMPLETION	0		11/07/23



Steubenville STEM Building CMR Design Schedule



SITE LOGISTICS PLAN



SECTION 013300

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
 - 1. Section 012900 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
 - 2. Section 013200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
 - 3. Section 017823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
 - 4. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 5. Section 017900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

- A. Submittals: Written and graphic information and physical samples that require responsive action. Submittals may be rejected for not complying with requirements.
- B. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

1.4 SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and, if applicable Construction Manager and additional time for handling and reviewing submittals required by those corrections.
 - 1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
 - 2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to

maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.

3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
 - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
 - a. Scheduled date for first submittal.
 - b. Specification Section number and title.
 - c. Submittal category: Action; informational.
 - d. Name of subcontractor.
 - e. Description of the Work covered.
 - f. Scheduled date for Architect's and, if applicable, Construction Manager's final release or approval.
 - g. Scheduled date of fabrication.
 - h. Scheduled dates for purchasing.
 - i. Scheduled dates for installation.
 - j. Activity or event number.

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.
 1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.
 - a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
 - b. Contractor shall conform with the data licensing agreement in the form of Agreement, AIA-E201.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
 2. Submit all submittal items required for each Specification Section concurrently. Do not submit partial submittals.
 3. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required.
 2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
 3. Resubmittal Review: Allow 10 business days for review of each resubmittal.
 4. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 business days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
 2. Name file with submittal number or other unique identifier, including revision identifier.
 3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect and, if applicable Construction Manager.
 4. Transmittal Form for Electronic Submittals: Attach submittal in PDF format, containing the following information:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name of Construction Manager.
 - e. Name of Contractor.
 - f. Name of firm or entity that prepared submittal.
 - g. Names of subcontractor, manufacturer, and supplier.
 - h. Category and type of submittal.
 - i. Submittal purpose and description.
 - j. Specification Section number and title.
 - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
 - l. Drawing number and detail references, as appropriate.
 - m. Location(s) where product is to be installed, as appropriate.
 - n. Related physical samples submitted directly.
 - o. Indication of full or partial submittal.
 - p. Remarks.
 5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
 - a. Project name.
 - b. Number and title of appropriate Specification Section.
 - c. Manufacturer name.
 - d. Product name.
- E. Options: Identify options requiring selection by Architect.
- F. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect and, if applicable Construction Manager on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

- G. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
 - 1. Note date and content of previous submittal.
 - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
 - 3. Resubmit submittals until they are marked with approval notation from Architect's and, if applicable Construction Manager's action stamp.
- H. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- I. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's and, if applicable Construction Manager's or Contractor's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
 - 1. Submit electronic submittals as PDF electronic files, using the Architect's web-based project information management system.
 - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
 - 2. Assemble and submit submittals required by individual Specification Sections into single packages incorporating all submittal requirements of the individual Specification Section. Do not submit individual items required by the Specification section as separate transmittals. Where possible, submit related items of Work required by the individual Sections concurrently to allow for concurrent review.
 - a. Submittal Submissions shall comply with the following:
 - 1) Shall not include any SDS – Safety Data Sheets. Any submittals submitted containing this information will either not be reviewed and returned for resubmittal or the Safety Data Sheets will be deleted from the submittal package prior to being returned to the Construction Manager.
 - 2) All product data, install instructions, etc. information shall be the manufacturer's current most current information.
 - 3) All information must be clear and legible (scans upon scans upon scans will not be accepted). PDF's downloaded directly from the manufacturer's website are preferred.
 - 4) All information shall be highlighted, checked, circled, marked, or identified in some way for the reviewer to easily determine which product, options, accessories, etc. are being proposed by the contractor.
 - 5) All questions regarding a submittal item (i.e. – shop drawings, etc.) shall be "clouded" for the reviewer to address and respond as a part of the submittal review comments.

- 6) Any deviations from the contract documents (i.e. – dimensional changes, etc.) shall be “clouded” for the reviewer to address and respond as a part of the submittal review comments.
 - 7) Product or system specific “Shop Drawings” shall be prepared by the contractor or supplier shall be generated via a software specific to their trade. Photo copies of the Construction Documents with notes added will not be accepted.
 - 8) All product submittals shall be from a manufacturer specified in the Contract Documents for each product. Submittals from a manufacturer not specified will be rejected and returned for resubmission.
 - a) If a Contractor wishes to submit a product substitution, they may do so by contacting and completing the substitution request form provided by the Architect.
 - b) NOTE: Prior to reviewing any substitution request, the Contractor shall agree to pay for the costs of the Architect (and/or its Consultant’s) time to review any substitution request. In the event that a product specified is no longer available, the Architect’s fees will be waived.
 - 9) All product submittals shall include any corresponding equipment, device, system, etc. tags indicated in the contract documents for each product submitted (i.e.: “PL-1”, “RB-1”, “WC-1”, “TMV-1”, “PRV-1, “RP-x-x”, “VVB-x-x”, Light Fixture Identifier, Electrical Panel Tags, etc.).
 - 10) All project submittals that are electrified or require control wiring between components (i.e.: door hardware, med gas systems, etc.) must include complete, project specific wiring diagrams for these electrified products.
 - 11) All product submittals shall also contain the manufacturer’s installation instructions.
 - 12) All “physical” samples and finish color selection submittals must be submitted through the Architect’s Project Management submittal process by the Construction Manager, so the submittal review process is initiated and recorded in Procore Application. Upload and attached photo or photos of the products being submitted. The “physical” sample or finish color selection submittal shall then be delivered concurrently to the Architect for review. Color samples will not be selected from an electronic reproduction or color chart.
3. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.

2.2 SUBMITTALS

- A. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's catalog cuts.
 - b. Manufacturer's product specifications.
 - c. Standard color charts.
 - d. Statement of compliance with specified referenced standards.
 - e. Testing by recognized testing agency.

- f. Application of testing agency labels and seals.
 - g. Notation of coordination requirements.
 - h. Availability and delivery time information.
 4. For equipment, include the following in addition to the above, as applicable:
 - a. Wiring diagrams showing factory-installed wiring.
 - b. Printed performance curves.
 - c. Operational range diagrams.
 - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
 5. Submit Product Data before or concurrent with Samples.
- B. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
 - a. Identification of products.
 - b. Schedules.
 - c. Compliance with specified standards.
 - d. Notation of coordination requirements.
 - e. Notation of dimensions established by field measurement.
 - f. Relationship and attachment to adjoining construction clearly indicated.
 - g. Seal and signature of professional engineer if specified.
 - h. Include graphic scale on all drawings.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches, but no larger than 30 by 42 inches.
- C. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
 2. Identification: Attach label on unexposed side of Samples that includes the following:
 - a. Generic description of Sample.
 - b. Product name and name of manufacturer.
 - c. Sample source.
 - d. Number and title of applicable Specification Section.
 - e. Specification paragraph number and generic name of each item.
 3. Provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
 - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.

- b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
- 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
 - a. Number of Samples: Submit two full sets of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line.
- 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 - a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.
 - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
 - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- D. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
 - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
 - 2. Manufacturer and product name, and model number if applicable.
 - 3. Number and name of room or space.
 - 4. Location within room or space.
- E. Coordination Drawing Submittals: Comply with requirements specified in Section 013100 "Project Management and Coordination."
- F. Contractor's Construction Schedule: Comply with requirements specified in Section 013200 "Construction Progress Documentation."
- G. Application for Payment and Schedule of Values: Comply with requirements specified in Section 012900 "Payment Procedures."
- H. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 014000 "Quality Requirements."
- I. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 017700 "Closeout Procedures."

- J. Maintenance Data: Comply with requirements specified in Section 017823 "Operation and Maintenance Data."
- K. LEED Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
- N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
 - 1. Name of evaluation organization.
 - 2. Date of evaluation.
 - 3. Time period when report is in effect.
 - 4. Product and manufacturers' names.
 - 5. Description of product.
 - 6. Test procedures and results.
 - 7. Limitations of use.
- U. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- V. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation

of product. Include written recommendations for primers and substrate preparation needed for adhesion.

- W. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- X. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.3 DELEGATED-DESIGN SERVICES

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

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Division 1 Section "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal and will mark stamp appropriately to indicate action.

- B. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- C. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION

HASENSTAB ARCHITECTS, INC.

ELECTRONIC FILE TRANSFER TO CONTRACTOR

Contractor: _____

Project: _____

Upon request, Hasenstab Architects and their consultants will provide electronic files for the Contractors convenience and use in the preparation of shop drawings related to the above mentioned project, subject to the following terms and conditions:

Hasenstab Architects make no representation as to the compatibility of these files with the Contractors hardware or software beyond the specified release of the referenced specifications.

Data contained on these electronic files are part of Hasenstab Architect's instruments of service and shall not be used by the Contractor or anyone else receiving these data through or from the Contractor for any purpose other than as a convenience in the preparation of shop drawings for the referenced project. Any other use or reuse by the Contractor or by others will be at their sole risk and without liability or legal exposure to Hasenstab Architects and their consultants. The Contractor agrees to make no claim and hereby waives, to the fullest extent permitted by law, any claim or cause of action of any nature against Hasenstab Architects and their consultants, officers, directors, employees, agents, or sub-consultants that may arise out of or in connection with the use of the electronic files.

Furthermore, the Contractor shall, to the fullest extent permitted by law, indemnify and hold Hasenstab Architects and their consultants, harmless against all damages, liabilities or costs, including reasonable attorneys' fees and defense costs, arising out of or resulting from the Contractors use of these electronic files.

These electronic files are not construction documents. Differences may exist between these electronic files and corresponding hard-copy construction documents. Hasenstab Architects and their consultants make no representation regarding the accuracy or completeness of the electronic files received. In the event that a conflict arises between the signed or sealed hard-copy construction documents prepared by Hasenstab Architects and their consultants, and the electronic files, the signed or sealed hard-copy construction documents shall govern. The Contractor is responsible for determining if any conflict exists. By the Contractors use of these electronic files, the Contractor is not relieved of their duty to fully comply with the contract documents, including, and without limitation, the need to check, confirm and coordinate all dimensions and details, take field measurements, verify field conditions and coordinate work with that of other contractors for the project. The Contractor assumes full responsibility for incorporation of all manual modifications, addenda, bulletins, clarifications and Change Orders to the Drawings.

Because information presented on the electronic files can be modified, unintentionally or otherwise, Hasenstab Architects and their consultants reserve the right to remove all indication of ownership and/or involvement from each electronic display.

Under no circumstances shall delivery of the electronic files for use by the Contractor be deemed a sale by Hasenstab Architects and their consultants, and Hasenstab Architects or their consultants make no warranties, either express or implied, of merchantability and fitness for any particular purpose. In no event shall Hasenstab Architects and their consultants be liable for any loss of profit or any consequential damages as a result of the Contractors use or reuse of these electronic files.

ACCEPTANCE OF CONTRACTOR (Authorized Representative)

BY: _____

TITLE: _____

DATE: _____



Steubenville City Schools Stem Building

Submittal Cover Sheet



Subcontractor: _____

Submittal # (from log) _____

Spec Section: _____

Product Description: _____

Line Item: _____

Approved By: _____

Date: _____

CM Review

Reviewed By: _____

(Note that CM review is for general conformance and that final approval of the submittals is the responsibility of the Architect)

Architect Review and Stamp

Reviewed By: _____

Consultant Review and Stamp

Reviewed By: _____

SECTION 014000

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
 - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections include the following:
 - 1. Section 014100 "Statement of Special Inspections" for test and inspections required by Ohio Building Code and procured by the Owner.
 - 2. Section 014001 "Mock-ups" for construction of mock-ups.
 - 3. Divisions 02 through 33 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

- C. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- D. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Using a term such as "carpentry" does not 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 tradespeople of the corresponding generic name.
- I. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.4 DELEGATED-DESIGN SERVICES

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

1.5 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- C. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or products that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
 - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
 - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
 - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
 - 1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.

- d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
 - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - f. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

1.7 QUALITY CONTROL

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

5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- E. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- F. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- G. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents. Submit schedule within 30 days of date established for the Notice to Proceed.
1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

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

3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
 2. Comply with the Contract Document requirements for Division 01 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION

SECTION 014001

MOCK UPS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general requirements and procedures for mock ups.
- B. Miscellaneous small scale mock-ups may be included in individual sections.

1.3 RELATED SECTIONS

- A. Divisions 2 through 33 for products applicable for additional mock ups.

1.4 SUBMITTALS

- A. Meet requirements of applicable Sections prior to constructing mock ups.

1.5 DEFINITIONS

- A. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 1. Laboratory Mockups: Full-size, physical assemblies constructed at testing facility to verify performance characteristics.
 - 2. Room Mockups: Mockups of typical interior spaces complete with wall, floor, and ceiling finishes, doors, windows, millwork, casework, specialties, furnishings and equipment, and lighting.

1.6 QUALITY CONTROL

- A. Inspection of the Workmanship: Provide inspection during construction of the mockups to identify and correct deficiencies in the workmanship. Indicate types of corrective actions required to bring work into compliance with standards of workmanship established by Contract requirements.

- B. Monitoring and Documentation: Maintain inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements.
- C. Mockups: Before installing portions of the Work requiring mockups, building mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 - 2. Notify Architect in advance of dates and times when mockups will be constructed.
 - 3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction of the Project.
 - 4. Demonstrate the proposed range of aesthetic effects and workmanship.
 - 5. Obtain Architect's and if applicable Construction Manager's approval of mockups before starting work, fabrication, or construction.
 - a. Allow minimum of ten days for initial review and each re-review of each mockup.
 - 6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 - 7. Demolish and remove mockups when directed, unless otherwise indicated.
- D. Integrated Exterior Mockups: Coordinate installation of exterior envelope materials and products for which mockups are required in individual specification sections, along with supporting materials.
- E. Room Mockups: Construct room mockups incorporating required materials and assemblies, finished in accordance with requirements. Provide required lighting and additional lighting where required to enable Architect to evaluate quality of Work.
- F. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections in Divisions 02 through 33.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Refer to applicable Divisions 2 through 33 for materials and products utilized in mockups.

PART 3 - EXECUTION

3.1 GENERAL

- A. Install materials and products per applicable Divisions 02 through 33.
- B. Install materials and products after submittal approvals.

3.2 MOCK UP SCHEDULE

- A. Exterior Wall Mockup: Build mockup to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of typical wall area as shown on Drawings. Construct entire wall system.
- B. Room Mockups: Build mockup of typical room or space as designated on Drawings.
 - 1. Approved mockup may become part of the completed work.
- C. Casework Mockup: Build mockup of casework units as described below or designated on Drawings.
 - 1. Description: TBD.
 - 2. Approved mockup may become part of the completed work.
- D. Other Mockups:
 - 1. Polished concrete finishing.
 - 2. Ceramic tile.

END OF SECTION

SECTION 014100

STATEMENT OF SPECIAL INSPECTIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements required for compliance with the Ohio Building Code (OBC), Chapter 17, Special Inspections and Tests.
 - 1. Specified tests, inspections, and related actions of this section do not limit Contractor's other quality-assurance and –control procedures that facilitate compliance with the contract documents.
 - 2. Requirements for Contractor to provide quality-assurance and –control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this section.
- B. The Owner will engage one or more qualified special inspectors and/or testing agencies to conduct the structural tests and special inspections specified in this section.
 - 1. These special inspections and tests are in addition to the inspections by the building officials, of the authority having jurisdiction, per OBC Section 108.
- C. Related Sections include the following:
 - 1. Division 02 through 33 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

- A. The following definitions are from the OBC Chapter 2.
- B. Approved Agency: An established and accredited testing laboratory, listing agency, inspection body, or field evaluation body recognized by the board of building standards providing services consistent with their accreditation and the code section requiring the approved agency service. The registered design professional in responsible charge and engineers of record involved in the design of the project are permitted to act as the approved agency and their personnel are permitted to act as the special inspector for the work designed by them, provided those personnel meet the qualification requirements of Section 1704.
- C. Approved Fabricator: An established and qualified person, firm or corporation approved in accordance with the rule of the board of building standards.
- D. Certificate of Compliance: A certificate stating that materials and products meet specified standards or that work was done in compliance with approved construction documents.

- E. Designated Seismic System: Those nonstructural components that require design in accordance with Chapter 13 of ASCE 7 and for which the component important factor, I_p , is great than 1 in accordance with Section 13.1.3 of ASCE 7.
 - F. Fabricated Item: Structural, load-bearing or lateral load-resisting members of assemblies consisting of materials assembled prior to installation in a building or structure, or subjected to operations such as heat treatment, thermal cutting, cold working or reforming after manufacture and prior to installation in a building or structure. Materials produced in accordance with standards referenced by this code, such as rolled structural steel shapes, steel reinforcing bars, masonry units and wood structural panels, or in accordance with a referenced standard that provides requirements for quality control done under the supervision of *an approved* agency, are not “fabricated items”.
 - G. Intumescent Fire Resistive Coatings: Thin film liquid mixture applied to substrates by brush, roller, spray or trowel which expands into a protective foamed layer to provide fire-resistant protection of the substrates when exposed to flame or intense heat.
 - H. Main Windforce Resisting System: An assemblage of structural elements assigned to provide support and stability for the overall structure. The system generally receives wind loading from more than one surface.
 - I. Mastic Fire Resistant Coatings: Liquid mixture applied to a substrate by brush, roller, spray or trowel that provides fire-resistant protection of a substrate when exposed to flame or intense heat.
 - J. Special Inspection: Inspection of construction requiring the expertise of an approved special inspector in order to ensure compliance with his code and the approved construction documents.
 - 1. Continuous special inspection: Special inspection by the special inspector who is present continuously when and where the work to be inspected is being performed.
 - 2. Periodic special inspection: Special inspection by the special inspector who is intermittently present where the work to be inspected has been or is being performed.
 - K. Special Inspection Agency: An established, independent, national recognized and accredited, third-party conformity assessment body regularly engaged in performing special inspections as required by Chapter 17.
 - L. Special Inspector: A qualified person who shall demonstrate competence for the inspection of the particular type of construction or operation requiring special inspection. A special inspector shall be an employee of an accredited special inspection agency recognized by the board in accordance with (OBC) Section 114 and rule 4101:7-6-01 of the (Ohio) Administrative Code, the registered design professional of record involved in the design of the project, or an agent contracted by the owner or registered design professional to perform special inspections whose qualifications comply with Section 1704.1.
 - M. Sprayed Fire-Resistant Materials: Cementitious or fibrous materials that are sprayed to provide fire-resistant protection of the substrates.
 - N. Structural Observation: The visual observation of the structural system by a registered design professional for general conformance to the approved construction documents.
- 1.4 QUALITY ASSURANCE
- A. Approved Special Inspectors and Agency Qualifications:

1. A Special Inspector shall meet the requirements set forth in the OBC definition of the Special Inspector and the following:
 - a. Minimum qualifications of inspection and testing agencies and their personnel shall comply with ASTM E329-03 standard Specification for Agencies in the Testing and / or inspection of Materials Used in Construction.
 - 1) Inspectors and individuals performing tests shall be certified for the work being performed as outlined in the appendix of the ASTM E329. Certification by organizations other than those listed must be submitted to the building official for consideration before proceeding with work.
2. In addition to these requirements, local jurisdiction may have additional requirements. It is the responsibility of the testing and inspection agencies to meet local requirements and comply with local procedures.

PART 2 - PRODUCTS (not used)

PART 3 - EXECUTION

3.1 CONTRACTOR'S RESPONSIBILITY

- A. The Contactor shall coordinate the inspection and testing services with the progress of the work. The Contractor shall provide sufficient notice to allow proper scheduling of all personnel. The Contractor shall provide safe access for performing inspection and on-site testing.
 1. The construction or work shall remain accessible and exposed for special inspection or testing purposes until completion of the required special inspection or tests.
- B. The Contractor shall submit schedules to the Owner, registered design professionals and testing and inspecting agencies. Schedules will note milestones and durations of time for materials requiring structural tests and special inspections.
- C. Each Contractor responsible for the construction of a main wind or seismic-force-resisting system, designated seismic system or a wind or seismic resisting component listed in the statement of special inspections shall submit a written statement of responsibility to the building official and to the Owner prior to the commencement of work on the system or component. The Contractor's statement of responsibility shall contain the following:
 1. Acknowledgment of awareness of the special requirements contained in the statement of special inspections.
 2. Acknowledgment that control will be exercised to obtain conformance with the construction documents approved by the building official.
 3. Procedures for exercising control within the Contractor's organization, the method and frequency of reporting and the distribution of the reports.
 4. Identification and qualifications of the person(s) exercising such control and their position(s) in the organization.

3.2 SPECIAL INSPECTOR RESPONSIBILITY

- A. Report Requirements - Special inspectors shall keep records of special inspections and tests.

1. The special inspectors shall submit reports of special inspections and tests to the building official and to the registered design professional in responsible charge per the OBC, as well as the Contractor, Architect and Owner. Reports shall indicate that work inspected or tested was or was not completed in conformance to approved construction documents.
 - a. Discrepancies shall be brought to the immediate attention of the Contractor for correction.
 - b. If they are not corrected, the discrepancies shall be brought to the attention of the building official and to the registered design professional in responsible charge prior to the completion of that phase of the work.
 - c. A final report documenting required special inspections and tests, and correction of any discrepancies noted in the inspections and tests, shall be submitted:
 - 1) At a point in time agreed upon prior to the start of work by the owner or the owner's representative.
 - 2) To the building official prior to the application for a certificate of occupancy.
2. Special inspection reports and test results shall include, but not be limited to, the following:
 - a. Date of inspection.
 - b. Description of inspections or tests performed including location (reference grid lines, floors, elevations, etc).
 - c. Statement noting that the work, material, and / or product conforms or does not conform to the construction document requirements.
 - 1) Name and signature of Contractor's representative who was notified of work, material, and / or products that do not meet the construction document requirements.
 - d. Name and signature of special inspector and / or testing agency representative performing the work.
- B. Schedule of Non-Compliant Work: Each agent shall maintain a log of work that does not meet the requirements of the construction documents. Include reference to original inspection / test report and subsequent dates of re-inspection / retesting.
- C. Reports shall be submitted within one week of the inspection or test. A Schedule of Non-Compliant Work shall be updated daily. Non-Compliant Work not corrected will be brought to the attention of the Owner, the Architect and the registered design professional in responsible charge (if not the Architect).
- D. Conflicts with the Contract Documents shall be brought to the attention of the Architect and the registered design professional in responsible charge (if not the Architect).

3.3 TESTING AND INSPECTION

- A. Testing and inspection shall be in accordance with the OBC Chapter 17 and attached Schedule of Special Inspections.

PART 4 - SCHEDULES AND FORMS

4.1 FABRICATOR'S CERTIFICATE OF COMPLIANCE

- A. Per the OBC, fabricators that have been registered and approved to perform work without special inspections shall submit certificates of compliance at the completion of fabrication.
 - 1. Certificates of Compliance are to be submitted to the Owner or the Owners representative for submittal to the building official.
 - 2. Certificates of Compliance are to state that the work was performed in accordance with the approved construction documents.

4.2 SCHEDULE OF SPECIAL INSPECTIONS

- A. See attachment.

END OF SECTION

SCHEDULE OF SPECIAL INSPECTIONS

Per Chapter 17 of the 2017 Ohio Building Code the following items require Special Inspections. **Special Inspectors must be employed by the Owner or registered design professional in responsible charge acting as the Owner's agent.**

PROJECT ADDRESS	SERVICE	APPLICABLE TO THIS PROJECT		
		PERMIT NO.	Y/N	EXTENT
1704.2.5 Inspection of Fabricators				
Verify fabrication/quality control procedures		N		
1705.1.1 Special Cases				
(work unusual in nature, including but not limited to alternative materials and systems, unusual design applications, materials and systems with special manufacturer's requirements)	Submittal review, shop (3) and/or field inspection	N		
1705.2 Steel Construction				
See Structural Drawings				
1705.2.2 Steel Construction Other Than Structural Steel				
See Structural Drawings				
1705.2.3 Open-web steel joists and joist girders.				
N/A				
1705.3 Concrete Construction				
See Structural Drawings				
1705.4 Masonry Construction (A) Level A, B and C Quality Assurance:				
See Structural Drawings				
1705.5 Wood Construction				
N/A				
1705.6 Soils				
See Structural Drawings				
1705.7 Driven Deep Foundations				
N/A				
1705.8 Cast-in-Place Deep Foundations				
N/A				
1705.9 Helical Pile Foundations				
N/A				

SCHEDULE OF SPECIAL INSPECTION SERVICES

Per Chapter 17 of the 2017 Ohio Building Code the following items require Special Inspections. **Special Inspectors must be employed by the Owner or registered design professional in responsible charge acting as the Owner's agent.**

PROJECT ADDRESS		PERMIT NO.		
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT		
		Y/N	EXTENT	AGENT*
1705.11.1 Structural Wood Special Inspections For Wind Resistance				
N/A				
1705.11.2 Cold-formed Steel Special Inspections For Wind Resistance				
N/A				
1705.11.3 Wind-resisting Components				
N/A				
1705.12.1 Structural Steel Special Inspections for Seismic Resistance				
NA				
1705.12.2 Structural Wood Special Inspections for Seismic Resistance				
N/A				
1705.12.3 Cold-formed Steel Light-Frame Construction Special Inspections for Seismic Resistance				
N/A				
1705.12.4 Designated Seismic Systems Verification				
N/A				
1705.12.5 Architectural Components Special Inspections for Seismic Resistance				
N/A				
1705.12.6 Mechanical and Electrical Components Special Inspections for Seismic Resistance				
N/A				
1705.12.7 Storage Racks Special Inspections for Seismic Resistance (SDC D,E,F)				
N/A				

SCHEDULE OF SPECIAL INSPECTION SERVICES

Per Chapter 17 of the 2017 Ohio Building Code the following items require Special Inspections. **Special Inspectors must be employed by the Owner or registered design professional in responsible charge acting as the Owner's agent.**

PROJECT ADDRESS	SERVICE	APPLICABLE TO THIS PROJECT		
		PERMIT NO.	Y/N	EXTENT
1705.12.8 Seismic Isolation Systems (SDC B,C,D,E,F)				
N/A				
1705.12.9 Cold-formed steel special bolted moment frames for Seismic Resistance				
N/A				
1705.13.1 Structural Steel Testing and Qualification for Seismic Resistance				
N/A				
1705.13.2 Seismic Certification of Nonstructural Components				
N/A				
1705.13.4 Seismic Isolation Systems				
N/A				
1705.14 Sprayed Fire-resistant Materials				
N/A				
1705.15 Mastic and Intumescent Fire-Resistant Coatings				
N/A				
1705.16 Exterior Insulation and Finish Systems (EIFS)				
N/A				

SCHEDULE OF SPECIAL INSPECTION SERVICES

Per Chapter 17 of the 2017 Ohio Building Code the following items require Special Inspections. Special Inspectors must be employed by the Owner or registered design professional in responsible charge acting as the Owner's agent.

PROJECT ADDRESS		PERMIT NO.	
MATERIAL / ACTIVITY	SERVICE	APPLICABLE TO THIS PROJECT	
		Y/N	EXTENT
			AGENT*
1705.17 Fire-Resistant Penetrations and Joints			
1. Inspect penetration firestop systems	Field testing	Y	Per ASTM E2174
2. Inspect fire-resistant joint systems	Field testing	Y	Per ASTM E2393
1705.18 Smoke Control Systems			
N/A			

-Special inspection reports are to be kept on the job for Building Inspector Verification.

-All discrepancies must be brought to the immediate attention of the Contractor for correction. If not corrected discrepancies must be brought to the immediate attention of the building official, and design professional in responsible charge before completion of that stage of work.

-A final special inspection report, from the Special Inspector(s), documenting the required special inspections were performed, correction of discrepancies, and compliance with construction documents shall be submitted before a Certificate of Occupancy is issued.

*** INSPECTION AGENTS**

FIRM

ADDRESS

1.

2.

3.

SECTION 014200

REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract.
- C. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- D. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- E. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- F. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- G. "Install": Operations at Project site including unloading, temporarily storing, unpacking, assembling, erecting, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.
- H. "Provide": Furnish and install, complete and ready for the intended use.
- I. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless 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.

- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.
- C. Copies of Standards: Each entity engaged in construction on Project should 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, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thorson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 015000

TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. The Work of this Section shall be included as a part of the Contract Documents of each Subcontractor on this Project. Where such Work applies only to one Subcontractor, it shall be defined as to which Subcontractor the Work belongs. Each Subcontractor as defined herein shall provide such Temporary Facilities as specified and as indicated in the Contract Documents. The term "provide" as used herein shall be defined as "provide all labor, materials, tools, equipment, services, and supervision necessary to complete all work."
- B. The Subcontractor(s) responsible for installing and maintaining such Temporary Facilities shall remove from the premises temporary work erected by him at the completion of the Project, or when requested to do so by the Construction Manager. Temporary structures and facilities become the property of the party furnishing them. Subcontractor(s) shall leave premises clean and in acceptable conditions as approved by the Construction Manager and Architect.
- C. Temporary Facilities Include, but are not limited to the following:
 - 1. Water Service and Distribution
 - 2. Temporary Electric Power and Light
 - 3. Temporary Heating/Cooling/Ventilation/Humidity Control
 - 4. Telephone Service
 - 5. Storm and Sanitary Sewer
- D. Support Facilities and Services include, but are not limited to the following:
 - 1. Field offices and storage sheds or trailers
 - 2. Lunch, Break, and Change Facilities for Subcontractor and Sub Employees
 - 3. Sanitary Facilities
 - 4. Drinking Water
 - 5. Waste Disposal (Dumpsters and Trash Receptacles)
 - 6. Temporary Enclosures
 - 7. Temporary Closure of Doors, Windows, and Misc. Openings
 - 8. Moisture and Sediment Control
 - 9. Temporary Project Identification Signs
 - 10. Openings for Electrical, Mechanical, and Other Trades
 - 11. Temporary First Aid Facilities
- E. Security and Protection facilities include, but are not limited to the following:
 - 1. Temporary Fire Protection

2. Safety and Health
3. Environmental Protection
4. Security and Health
5. Utility Protection

1.3 DIVISION OF RESPONSIBILITIES

- A. General: These Specifications assign each Subcontractor specific responsibilities for certain Temporary Facilities used by themselves and by other Subcontractors and other entities at the site.
- B. The Construction Manager will be responsible for the following:
 1. CM Office and Subcontractor office spaces the Schools Applied Building.
 2. Temporary Telephone and Data Service for trade contractors and CM at Applied building will be provided by the owner.
 3. Snow Removal; except for roof deck and building interior snow removal required due to a schedule delay caused by a Subcontractor.
 4. ***The Owner will provide office space and break areas for all subcontractors. Due to site limitations subcontractor office trailers for men and staff will be not be permitted unless other provisions are made with CM and owner.***
 5. Temporary heat, cooling, ventilation, and humidity control prior to enclosure of the building where these facilities are necessary for its own construction activity necessary to meet the construction schedule.
 6. Additional temporary heat, cooling, and humidity control after enclosure of the building if materials installed by that Subcontractor require ambient temperatures or relative humidity levels outside of that required to be provided by the HVAC Subcontractor.
- C. Each Subcontractor is responsible for the following, unless noted otherwise:
 1. Installation, operation, maintenance, and removal of each temporary facility usually considered as its own normal construction activity, as well as the costs and use charges associated with each facility.
 2. Plug-in electric power cords and extension cords, supplementary plug-in task lighting, and special lighting necessary exclusively for its own activities.
 3. Its own field office, storage, and fabrication sheds and/or trailers.
 4. Drinking water for its own labor forces.
 5. Temporary water service as required to complete its own work prior to activation of the permanent water service.
 6. Temporary Protection, including perimeter fall protection or load bearing covers, for floor and roof openings required to complete the work of that Subcontractor's bid package. This includes maintenance and removal of Temporary Protection measures.
 7. Temporary traffic control and maintenance as required to complete the work of its bid package.
 8. Complete Collection and Disposal of its own hazardous, dangerous, unsanitary, and other harmful or "controlled" waste material.
 9. Secure lockup of its own tools, materials, and equipment. (*Materials remain the property of the Subcontractor until installed or otherwise accepted by the owner.)
 10. Construction aids and miscellaneous services and facilities necessary exclusively for its own construction activities.
 11. Collection and Disposal to project dumpsters of own Construction Debris and Waste daily.
 12. Fire Extinguishers for specific task work and placed at all temporary facilities (Trailers, Sheds, etc.)
 13. All measures required to comply with OSHA standards and regulations for its own work including First Aid Facilities.
 14. Environmental protection relative to its activities and/or products utilized

15. Each Sub-contractor shall take care not to abuse or otherwise cause or create damage unnecessarily to paved and/or stoned roadways. Damage that is determined by the Construction Manager to be either deliberate or out of negligence on the part of any Subcontractor shall be the responsibility of that Subcontractor to repair.
 16. Electrical Generator(s) for own temporary power prior to Site Temporary Electric and/or use at remote areas of the site.
 17. Roof deck or building interior snow removal required due to a schedule delay caused by that Subcontractor.
 18. Temporary protection, including maintenance and removal, of finished surfaces installed under that Subcontractor's bid package. Temporary protection measures shall be maintained from time of installation until removal as directed by the Construction Manager.
 19. Temporary protection of adjacent work during installation of own work.
 20. Each Subcontractor shall become familiar with all provisions of this Temporary Facilities Section as it applies to themselves and to other Subcontractors on the site to determine fully their own obligations.
- D. The Masonry Subcontractor is responsible for the following:
1. Controls and Maintenance at mixing areas to prevent stormwater contamination.
 2. Temporary openings in masonry walls as required to allow for delivery and installation of materials and equipment.
 3. Temporary, metered water service for its own work for the duration of the project.
 4. Provisions for cold and hot weather masonry procedures as required to complete work in accordance with the project schedule.
 5. Grading of site required to due to installation of work.
- F. The General Trades Subcontract is responsible for the following:
1. Dumpsters and Construction Waste Management Plan for the duration of the project including separate trash, metal recycling, and paper recycling dumpsters.
 2. This Subcontractor is responsible to secure the building as temporary and/or permanent enclosure is achieved. This includes providing temporary locks, hasps, chains, cables, etc. All Keys and/or copies of keys shall also be provided for distribution as determined by the CM and controlled by this Subcontractor.
- G. The Interior/Exterior Framing Subcontractor is responsible for the following:
1. This Subcontractor shall be responsible, as listed in the scope of work, for temporary enclosure of the building, or portions thereof, after the building shell has been essentially completed. Temporary enclosures to a height of 8' AFF shall consist of minimum 2x4 wood framing at maximum 24" O.C. with minimum 1/2" plywood to cover window, "storefront", and other miscellaneous openings. Temporary enclosures above 8' AFF shall consist of minimum framing at maximum 48" O.C. with minimum 6 mil reinforced polyethylene sheeting (Vis queen) to cover window. Storefront and Curtain wall areas need to include framing and sheathing as temporary protection. and other miscellaneous openings. Each enclosure shall be caulked "watertight" from the exterior. Entry Doors and/or temporary dividing or isolation doors shall also be of plywood construction, 1/2" in thickness or greater; include self-closing hinges, closers, hasps and sliding wood door barricades. "Enclosure" shall be substantial enough to withstand weather, retain temporary heat, and resist physical abuse and/or unwanted entry into the buildings or areas of the building.
 2. Providing means of additional air movement and humidity control during drywall finishing activities.
 3. Remove of perimeter safety cable stanchions, including grinding flush with concrete deck.
- H. The Plumbing Subcontractor is responsible for the following:

1. Piped temporary water service inside building once permanent service is operational. The CM shall pay costs for water usage once the permanent service is operational.
 2. Temporary roof drain piping (if necessary and as directed by the Construction Manager)
 3. This Sub-contractor is responsible to provide fittings and valves in the permanent gas line for temporary connections of the temporary heating units and hoses supplied by the CM.
- I. The HVAC Subcontractor is responsible for the following:
1. Start-Up of Units for use of Temporary Heating, Cooling, Ventilation, and Dehumidification equipment, power, and maintenance, upon enclosure of the building and as directed by the CM. This subcontractor is to work with the CM to and the HVAC manufacturer's representative for starting up permanent units for use of temporary building conditioning.
 2. Temporary Heat shall be made available upon Temporary Enclosure of each building area as required will be provided by the CM.
- J. This Subcontractor shall be responsible for temporary filters necessary to meet LEED, IAQ requirements for construction. HVAC Sub-contractor shall be responsible for all servicing that may be required for use of temporary heating units. The CM shall pay costs for gas usage once the permanent service is operational.
1. This Subcontractor shall have primary responsibility for the IAQ Plan development, implementation, and maintenance.
 2. This Sub-contractor responsible for covering and protecting all ductwork and HVAC piping. Included are the capping of pipe ends and covering of duct openings as required by the IAQ Plan, both before and after installation. This Sub-Contractor shall provide minimum MERV 8 filtration media at all return air duct openings and replace as necessary once the building HVAC systems are started up until Contract Completion.
 3. This Subcontractor shall provide and maintain minimum MERV 8 temporary filters in all HVAC equipment from time of start-up until Contract Completion.
- K. The Electrical Subcontractor is responsible for the following:
1. Temporary electric power service and on-site service distribution for the Project. (*It is the intent of this specification that the Permanent Power be obtained and available at the earliest possible date and that it be utilized for construction service.) This Subcontractor to coordinate all installation and interface with Utility Company as may be required. Subcontractor shall also provide any additional temporary transformers and/or equipment necessary to provide construction power and lighting to the building and site. Temporary electric service shall be provided with adequate capacity to meet the power and lighting requirements of this specifications section, including power requirements for temporary heat. Temporary electric service shall be provided by no later than July 12, 2020. If temporary service from the Utility Company cannot be provided by that date, this Subcontractor shall provide electric generator(s) as required and shall pay all rental and fuel costs. The CM shall pay costs for metered temporary electric usage only. Costs for installation of temporary service, including utility company charges, shall be the responsibility of this Subcontractor. The Owner/CM shall pay utility company's costs for installation of permanent service and shall also pay the costs for permanent electric service usage
 2. Temporary lighting including daily maintenance during all phases of construction as required by OSHA standards.
 3. Dedicated Temporary Power receptacles and circuits for connection of Temporary Heat.
- L. The Sitework Subcontractor is responsible for the following:
1. Maintenance and removal of all erosion control devices, including silt fence, inlet protection, and sediment basins. This Sub-contractor remains responsible to remove all erosion control at

the conclusion of the project and to restore to original condition and/or to meet final plan requirements.

2. Temporary seeding as required by the project Storm Water Pollution Prevention Plan. Maintenance and removal of construction entrances.
3. Maintenance of construction haul roads, access roads, staging areas, and parking areas.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.
- C. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1 when work affects egress from occupied portions of existing facilities.

1.5 EQUIPMENT

- A. General: Provide new equipment. If acceptable to the CM, the Sub-contractor may use undamaged, previously used equipment in serviceable condition. Provide equipment suitable for use intended.
- B. Water Hoses: Provide ¾" inch, heavy duty, abrasion resistant, flexible rubber hoses 100 feet long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shutoff nozzles at hose discharge.
- C. Electrical Outlets: Provide properly configured, NEMA polarized outlets to prevent insertion of 110 to 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. Do not exceed safe length voltage ratio.
- E. Lamps and Light Fixtures: Provide rough service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures were exposed to breakage. Provide exterior rated fixtures were exposed to moisture. (*Reference also 3.02 C.2 below.)
- F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FL, or another recognized trade association related to the type of fuel being consumed.
- G. 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.
- H. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

1.6 INSTALLATION, GENERAL

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

1.7 MATERIALS

- A. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- B. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches.
- C. Floor Surface Protection Material: Provide Barriclad 2.2 material or an alternative product approved by Architect. Manufacturer: Barriclad Technologies, Inc.; Phone: 1-888-478-0304; www.barriclad.com.
- D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

1.8 SITE ENCLOSURE FENCE

- A. Owner will provide a site enclosed fence completed.
 - 1. Maintain fence in a neat and orderly condition for the duration of the project. Contract or expand fence limits as required to enclose the area of site work or as requested by the Owner or Architect.

1.9 CONSTRUCTION PERSONNEL PARKING AREAS

- A. Temporary parking area for use by construction personnel as indicated on Drawings or if not indicated, sized to accommodate project requirements.

1.10 SUPPORT FACILITIES INSTALLATION

- A. Field Office and Storage Sheds
 - 1. Mobile offices and storage facilities will not be allowed unless given written approval from the CM.
- B. Waste Disposal
 - 1. The General Trades Contractor shall, for the duration of the project, provide and pay for dumpsters for use by all trades. Rubbish container(s) shall be adequately sized for the amount and type of waste, debris, and rubbish generated.

2. Construction Manager shall be responsible for the development and implementation of the Construction Waste Management Plan. This Subcontractor is responsible for providing ALL dumpsters (both disposal and recycle) for all trades.
3. Each Subcontractor on site is responsible to place their construction debris in the dumpsters furnished by the Carpentry Subcontractor.

C. Temporary Enclosures

1. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
2. The interior/exterior framing Subcontractor shall, unless otherwise noted, provide temporary enclosures.
3. The interior/exterior framing Subcontractor shall caulk all Temporary Enclosures from the exterior to ensure enclosures are as watertight as possible.

1.11 PROJECT SIGNS

- A. Identification Signs: The Construction Manager shall provide Project identification signs when indicated on Drawings. Each Subcontractor shall provide temporary traffic control and maintenance signage as required to complete the work of its bid package.
- B. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
 1. Provide temporary, directional signs for construction personnel and visitors.
- C. Maintain and touchup signs so they are legible at all times.
- D. Unauthorized signs are not permitted.

1.12 TEMPORARY WATER SERVICE

- A. Install water service and distribution piping in sizes and pressures adequate for construction.
 1. All fees, permits, connection charges, utility company equipment, usage charges, etc. are to be paid by the Contractor responsible for providing the temporary water service.

1.13 TEMPORARY FIRST AID FACILITIES

- A. Each Subcontractor shall provide first aid facilities on site as required by Federal, State, or Local Safety Regulations.
- B. Each Contractor and Subcontractor shall, at the beginning of their work, locate, and make arrangements for services with, the nearest first aid, emergency, and medical facilities to provide care to employees in the event of injury.

1.14 SAFETY AND HEALTH REGULATIONS FOR CONSTRUCTION

- A. These Construction Documents and the construction hereby contemplated shall be governed by applicable provisions of Federal, State, and local regulations for Construction Safety in the State in which the project is located.

1. Each Subcontractor shall be responsible for the safety and health of persons and property affected by the Sub-contractor's performance of the Work including work performed by his Subcontractors. This requirement shall apply continuously during the entire contract period and shall not be limited to normal working hours.
2. Each Subcontractor shall designate a Qualified Safety and Health Representative to be responsible for the administration of the Subcontractor's Safety and Health Program. This representative will be made known to, and will be subject to approval by, the Construction Manager and Owner at the time of contract award. They shall maintain an active role in the project throughout and will be available at the discretion of the Construction Manager.
3. All provisions of this specification relating to Safety and Health shall apply to the lower tier Subcontractor(s) of the Prime Subcontractors as one and the same. The Prime Subcontractor is responsible for Subcontractor/Vendor compliance with respect to Project Rules and Regulations as well as all other provisions described herein.

B. Each Subcontractor shall be responsible for compliance with the above noted safety and health regulations for construction as applicable to the Subcontractor's Contract and the Subcontractor's construction means and methods. Each Prime Subcontractor shall be liable for violations as may be cited or charged against the Subcontractor or his lower tier Subcontractors by authorities governing the safety and health regulations for construction.

1. The Owner and Architect shall not be responsible for construction means and methods and shall not be responsible for construction safety. The Subcontractor shall indemnify and hold harmless the Owner, Architect, and the Construction Manager.

C. Barricades

1. Each Subcontractor shall provide and pay for temporary construction barricades as required for safety and security for his specified portion of the Work.
2. Each Subcontractor must provide barricades and/or other similar protection from injury as is required by applicable laws at excavations, changes in grade, slab edges, slab openings, equipment hazards, overhead work, and other similar construction hazards. This "protection" applies to Subcontractors own work and applies to protecting the Subcontractors Employees from other potential or recognized hazards adjacent to the work where necessary.
3. Barricades must be painted with appropriate colors, graphics, and warning signs to inform personnel and the public of hazard being protected against.
4. Where appropriate and needed, provide lighting, including flashing red or amber lights.
5. Proper Warning Signs must be posted on barricades and/or at other prominent locations as may be appropriate for all Construction Activities.

1.15 OPENINGS FOR ELECTRICAL, MECHANICAL, AND OTHER TRADES

- A. Temporary openings not called for on the Drawings, which may be required for the purpose of bringing equipment or materials into the buildings or for placing same, shall be performed as approved by the Construction Manager and Architect. The Subcontractor requiring the opening shall be responsible to coordinate the installation of such openings. Subcontractors in need of such openings and/or access shall identify the need for these openings as early as possible in the project. No additional compensation shall be provided for costs associated with a Subcontractor's failure to timely and accurately coordinate temporary openings required for the installation of its work.
- B. Infill of temporary openings after they are no longer required shall be completed by the Subcontractor doing the affected construction work, at no additional cost.

- C. Holes provided in general construction work to permit installation of lines for temporary mechanical and electrical services shall be restored by the Subcontractor doing the affected construction work, after removal of such lines, at no additional cost.

1.16 TEMPORARY PORTABLE SANITARY FACILITIES

- A. Provide temporary/portable toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

1.17 EXISTING BUILDING ENCLOSURES

- A. Maintain enclosure of the existing building envelope for the duration of construction. Where temporary openings are required in the existing building envelope, provide temporary enclosures to protect in progress and completed construction from exposure, foul weather, other construction operations and similar activities. Existing building envelope shall remain weathertight for the duration of the work.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.

1.18 TEMPORARY BUILDING ENCLOSURES

- A. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations and similar activities. Provide temporary weathertight enclosure for building exterior.
 - 1. Where heating or cooling is needed and permanent enclosure is incomplete, insulate temporary enclosures.
 - 2. Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities.
 - a. The interior/exterior framing Subcontractor shall, unless otherwise noted, provide temporary enclosures.
 - b. The interior/exterior framing Subcontractor shall caulk all Temporary Enclosures from the exterior to ensure enclosures are as watertight as possible.
 - c. Close openings through floor or roof decks and horizontal surfaces with load bearing, wood framed construction. Protection of said openings is to be provided, maintained, and removed by the Subcontractor requiring the opening.
 - d. Maintain required egress for protection of life and property.
 - 3. The Subcontractor shall be responsible for reviewing the Contract Documents, including the Bid Summary Schedule, to determine the extent of Temporary Enclosures required. All costs for Temporary Enclosures as described in this specification section shall be included in the interior/exterior framing Subcontractor's base bid.

1.19 TEMPORARY PARTITIONS

- A. For projects which require specific "Infection Control Procedures (ICP)", the information contained below in Paragraph B is superseded by the Division 01 "ICP" requirements.

1. The requirements of the Division 01 “Infection Control Procedures” pertain to and are the responsibility of each Contract, unless specifically noted otherwise.
- B. Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
 1. Construct dustproof partitions as indicated on the drawings.
 2. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
 3. Insulate partitions to control noise transmission to occupied areas.
 4. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 5. Maintain the integrity of the dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
 6. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
 7. Provide walk-off mats at each entrance through temporary partitions.

1.20 UTILITY PROTECTION

- A. Existing utility lines and structures indicated or known, and utility lines constructed for this Project shall be protected from damage during construction operations.
- B. Locate and flag lines and structures before beginning excavation and other construction operations.
- C. When utility lines and structures that are to be removed or relocated are encountered within the area of operations, notify the CM, and affected utility in ample time for the necessary measures to be taken to prevent interruption of the services.
- D. Damage to existing utility lines or structures not indicated or known shall be reported immediately to the Construction Manager and the affected utility.

1.21 PROTECTION OF FINISHES

- A. Provide surface protection material to protect existing and new flooring, walls, ceiling, etc. surfaces.
 1. The Project Coordinator shall be responsible for the protection of all floor finishes installed as new construction, as it pertains to this project.
 2. Each Contract shall be responsible for the protection of all finishes, unless noted otherwise. Finishes may include but not be limited to existing flooring and new/existing (walls, ceilings, countertops, furniture, equipment, etc.).

1.22 ISOLATION OF WORK AREAS IN OCCUPIED FACILITIES

- A. For projects which require specific “Infection Control Procedures (ICP)”, the information contained below in Paragraph B is superseded by the Divisions 01, “ICP” requirements.
 1. The requirements of the Division 01, “Infection Control Procedures” pertain to and are the responsibility of each Contract, unless specifically noted otherwise.
- B. Prevent dust, fumes, and odors from entering occupied areas.

1. In conjunction with the construction of temporary partitions, but prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
 - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
 - b. Provide and maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is completed.
 - c. Reconnect supply and return ductwork upon completion of the work in the isolated area.

1.23 TEMPORARY HEATING PRIOR TO BUILDING ENCLOSURE

- A. Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- B. HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.
 3. All fees, permits, connection charges, delivery and/or usage charges, etc. are to be paid by the Contract responsible for providing the temporary heating services.

1.24 VENTILATION AND HUMIDITY CONTROL PRIOR TO BUILDING ENCLOSURE

- A. Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.
- B. Each Subcontractor shall perform the work of their bid package in a manner consistent with the requirements of the project Storm Water Pollution Prevention Plan (SWPPP). The Subcontractors responsible for dewatering, the manner of providing sediment control and handling of water or water flows shall meet with the approval of the Architect and Owner. Any action or conditions not in compliance with the project SWPPP shall be immediately reported to the Construction Manager.

1.25 HEATING, COOLING AND VENTILATION AFTER BUILDING ENCLOSURE

- A. Heating
 1. Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures

- or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
2. HVAC Equipment: Provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - a. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
 - b. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.
 3. If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Division 01 Section "Closeout Procedures".
- B. Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

1.26 SECURITY ENCLOSURE AND LOCKUP

- A. Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each workday.
- B. Install substantial temporary enclosure of completed or partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security.
 - a. Where materials and equipment must be stored, and are of value attractive for theft, provide a secure lockup. Enforce discipline in connection with installation and release of materials to minimize opportunity for theft and vandalism.
 - b. All Storage areas and/or enclosures are to be approved in advance by the Construction Manager for location and construction.
- C. The General Trades Subcontractor shall provide temporary doors, closures, and Heavy-Duty Padlocks for the building as a whole and for large common areas as may be directed by the Construction Manager (i.e., Cafeteria, Gymnasium, Mech. Rooms, etc.).
- D. The Carpentry Subcontractor shall provide temporary doors and closures for "specialty" lockup areas as may be directed by the CM (i.e., Storage of Electrical Hardware, Door Hardware, Electrical Rooms, etc.), cost to be included in the Subcontractor's Base Bid. Each Subcontractor requiring these spaces will be responsible for providing their own locks.
- E. Provide hinged plywood or barren doors with lock to maintain temperatures necessary to perform the Work and provide temporary building security.

- F. Permanent closures of openings may be installed, provided they are protected and are left in undamaged condition when building is completed.

1.27 TEMPORARY FIRE PROTECTION

1. Each Subcontractor shall provide, maintain, and have readily accessible, approved type fire extinguishers when working adjacent to hazardous areas such as painting and welding, or when using torches or open flames for heating or cutting. Subcontractors shall provide and utilize extinguishers as required by OSHA Standards regardless of activities in progress. Personnel working on the Project shall be familiarized with the locations and operation of fire extinguishers.
2. Fire Extinguishers shall as a minimum be identified with company name and extinguisher number, inspected on a regular basis, and proper documentation of same maintained at the site. Any Extinguisher not meeting approval will be removed from site and repaired, refilled, or replaced as is deemed appropriate.
3. Each Subcontractor shall until fire protection needs are supplied by permanent facilities, install, and maintain temporary fire protection facilities of the types needed to protect against reasonable predictable and controllable fire losses. Comply with NFPA 10 "Standard for Portable Fire Extinguishers" and NFPA 241 "Standard for Safeguarding Construction, Alterations, and Demolition Operations."
4. The Subcontractor shall provide fire extinguishers for general use where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.
 - a. Store combustible materials in approved containers in fire safe locations.
 - b. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire protection facilities, stairways, and other access routes for fighting fires.
 - c. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.
 - d. No smoking is allowed on the project site at any time.
5. 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.

1.28 BARRICADES, WARNING SIGNS AND LIGHTS

- A. Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

1.29 COVERED WALKWAY

- A. Erect protective, covered walkway for passage of individuals through or adjacent to Project site. Coordinate with entrance gates, other facilities, and obstructions. Comply with regulations of authorities having jurisdiction.
 1. Construct covered walkways using scaffold or shoring framing.
 2. Provide overhead decking, protective enclosure walls, handrails, barricades, warning signs, exit signs, lights, safe and well-drained walkways, and similar provisions for protection and safe passage.
 3. Paint and maintain appearance of walkway for duration of the Work.

1.30 LIFTS AND HOISTS

- A. Provide facilities necessary for hoisting materials and personnel.
 - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
 - a. For facilities that may contain heli-pads, coordinate all lifting and hoisting activities with Owner, prior to scheduling any lifting or hoisting activity.

1.31 ENVIRONMENTAL PROTECTION

- A. Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
 - 1. In order to prevent and to provide for abatement and control of environmental pollution arising from the construction activities of the Subcontractor and his subcontractors in the performance of this Contract, they shall comply with applicable federal, state, and local laws, and regulations concerning environmental pollution control and abatement as well as the specific requirements stated elsewhere in the Contract Documents.
 - 2. Items having apparent historical or archaeological interest which are discovered during construction activities shall be carefully preserved. The Subcontractor shall leave the archaeological find undisturbed and shall immediately report the find to the Construction Manager and Architect so that the proper authorities may be notified.
 - 3. No Subcontractor shall pollute water resources with fuels, oils, bitumen's, calcium, chloride, acids, or other harmful materials. It is the responsibility of each Subcontractor to investigate and comply with applicable federal, state, county, and municipal laws concerning pollution of rivers and streams. Work under this Contract shall be performed in such a manner that objectionable conditions will not be created in water resources through or adjacent to the project areas.
 - a. Spillages: Throughout the duration of the Project, special measures shall be taken to prevent chemicals, fuels, oils, grease, bituminous materials, waste washings, herbicides and insecticides, cementitious materials, or other harmful materials from entering water resources.
 - b. Disposal: If waste material is dumped in unauthorized areas, the Subcontractor shall remove the material and restore the area to the condition of the adjacent undisturbed area. If necessary, contaminated ground shall be excavated, disposed of as directed by the Construction Manager and Architect, and replaced with suitable fill material, compacted, and finished with topsoil, at the expense of the Subcontractor.
 - 4. Each Sub-contractor will be required to minimize dispersed dust at required excavations, embankments, stockpiles, haul roads, permanent access roads, plant sites, waste areas, borrow areas, and other work areas on or off site to minimize dispersed dust.
 - 5. The Trades Sub-contractors noted in the Summary of Work shall provide street and sidewalk cleaning services as defined below:
 - a. Daily remove all mud, dust and debris from paved roadways and sidewalks running throughout and adjacent to the site.
 - b. Make use of commercial street cleaning equipment to clean all paved roadways. A skid steer with broom attachment will not be sufficient.
 - c. Make use of water to facilitate removal of the dust.

- d. Use labor forces to hand sweep sidewalks as necessary to ensure compliance with the requirements.
 - e. At least weekly make use of commercial street sweeping equipment to remove dust and mud from all paved surfaces and eliminate blowing dust.
6. The Sitework Subcontractor shall provide dust controls for the entire site. Dust Control requirements are as defined below:
- a. At least weekly, and twice a day while conditions persist, water down the site to eliminate blowing dust.
 - b. Make use of water truck(s) to accomplish this task.
 - 1) Comply with work restrictions specified in Division 01 Section "Summary."

1.32 TEMPORARY ELEVATOR USE

- A. This applies to new elevators. Refer to work restrictions for use of existing elevators in existing facilities.
- B. Use of elevators is permitted.
 - 1. Project coordinator shall provide protective coverings and barriers to protect, elevator car, entrance doors and frames.

1.33 TEMPORARY STAIRS

- A. Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

1.34 TEMPORARY USE OF PERMANENT STAIRS

- A. Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.
 - 1. Project Coordinator shall clean and maintain stairs during construction.

1.35 TEMPORARY ROADS AND PAVED AREAS

- A. Construct and maintain temporary roads and paved areas adequate for construction operations.
 - 1. Provide dust-control treatment that is nonpolluting and nontracking. Reapply treatment as required to minimize dust.
 - 2. Provide road and paved area street sweeping.

1.36 TRAFFIC CONTROLS

- A. Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.

1.37 DEWATERING FACILITIES AND DRAINS

- A. Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.

1.38 TEMPORARY EROSION AND SEDIMENTATION CONTROL

- A. Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Inspect, repair, and maintain erosion- and sedimentation-control measures during construction until permanent vegetation has been established.
 - 3. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from Project site during the course of Project.
 - 4. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.

1.39 STORMWATER CONTROL

- A. Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

1.40 TREE AND PLANT PROTECTION

- A. Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.
 - 1. When included, comply with requirements specified in Division 01 Section "Temporary Tree and Plant Protection."

1.41 PEST CONTROL

- A. Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

1.42 OPERATION, TERMINATION, AND REMOVAL OF TEMPORARY FACILITIES

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

- B. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
 - 3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 016000

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
 - 1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 - 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
 - 1. Schedule delivery to minimize long-term storage at Project 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 Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 - 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.
- C. Storage:
 - 1. Store products to allow for inspection and measurement of quantity or counting of units.
 - 2. Store materials in a manner that will not endanger Project structure.
 - 3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
 - 5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 6. Protect stored products from damage and liquids from freezing.
 - 7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.6 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
 - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 - 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
 - 1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 - 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 - 3. See Divisions 02 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.

- C. Submittal Time: Comply with requirements in Division 01 Section "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 3. Products: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements.
 4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
 5. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Provide custom color or finish if required.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches. Provide custom color or finish if required.
1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
 2. No additional compensation will be owed to the Contractor for matching Architect's sample.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 017300

EXECUTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the work.
 - 4. Coordination of Owner-installed products.
 - 5. Progress cleaning.
 - 6. Starting and adjusting.
 - 7. Protection of installed construction.
 - 8. Correction of the Work.

1.3 QUALITY ASSURANCE

- A. Land Surveyor Qualifications: A professional land surveyor who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing land-surveying services of the kind indicated.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Existing Conditions: The existence and location of underground and other utilities, and construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
 - 1. Before construction, verify the location and points of connection of utility services.
- B. Existing Utilities: 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, mechanical and electrical systems, and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- C. Examination and Acceptance of Conditions: Before proceeding with each component of the work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
1. Written Report: Where a written report listing conditions detrimental to performance of the Work is required by other Sections, include the following:
 - a. Description of the Work.
 - b. List of detrimental conditions, including substrates.
 - c. List of unacceptable installation tolerances.
 - d. Recommended corrections.
 2. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 3. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 4. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
- D. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor or professional engineer to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Do not scale Drawings to obtain required dimensions.
 - 3. Inform installers of lines and levels to which they must comply.
 - 4. Check the location, level and plumb, of every major element as the Work progresses.
 - 5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
 - 6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

- A. Identification: Identify existing benchmarks, control points, and property corners.
- B. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
 - 1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
 - 2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- C. Benchmarks: Establish and maintain a minimum of three permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
 - 1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
 - 2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.

3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
 1. Make vertical work plumb and make horizontal work level.
 2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
 3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
 4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.
- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Sequence the work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Anchors and Fasteners: Provide blocking and attachment plates and anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 2. Allow for building movement, including thermal expansion and contraction.
 3. Coordinate installation of anchorages. 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.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.
 - 1. Construction Schedule: Inform Owner of Contractor's preferred construction schedule for Owner's portion of the Work. Adjust construction schedule based on a mutually agreeable timetable. Notify Owner if changes to schedule are required due to differences in actual construction progress.
 - 2. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. Enforce requirements strictly. Dispose of materials lawfully.
 - 1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 - 2. Do not hold materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
 - 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
 - 1. Remove liquid spills promptly.
 - 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Daily cleaning, including broom cleaning and mopping, of the overall Project Area (including construction egress pathways, stairwells, site staging areas, dumpster staging areas, etc.) is the responsibility of the Project Coordinator. Cleaning required in a specific area of the Project resulting from concentrated effort by a particular trade is the responsibility of that trade.
- E. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- F. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- G. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

- H. Waste Disposal: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- I. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.
- J. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- K. Limiting Exposures: 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.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 01 Section "Quality Requirements."
- E. Refer to Mechanical, Electrical and Plumbing specification sections for additional requirements.

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 Section "Cutting and Patching."
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.

- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION

SECTION 017329

CUTTING AND PATCHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Cutting and patching.
- B. Related Sections:
 - 1. Section 024119 "Selective Structure Demolition" for demolition and removal of selected portions of the building.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.
- C. Selective Demolition is recognized as a related but separate category of Work, which may or may not require cutting and patching as defined in this Section.

1.4 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection. Engage a Structural Engineer registered in jurisdiction of the Work to verify activities and procedures.
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety. Operational elements include but are not limited to the following:
 - a. Primary operational systems and equipment.

- b. Fire separation assemblies.
 - c. Air or smoke barriers.
 - d. Fire-suppression systems.
 - e. Mechanical systems piping and ducts.
 - f. Control systems.
 - g. Communication systems.
 - h. Conveying systems.
 - i. Electrical wiring systems.
 - j. Operating systems of special construction.
3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or results in increased maintenance or decreased operational life or safety. Other construction elements include but are not limited to the following:
- a. Water, moisture, or vapor barriers.
 - b. Membranes and flashings.
 - c. Exterior curtain-wall construction.
 - d. Equipment supports.
 - e. Piping, ductwork, vessels, and equipment.
 - f. Noise- and vibration-control elements and systems.
4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- B. Cutting and Patching Conference: Before proceeding, meet at Project 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.
- C. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.5 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."

3.3 CUTTING AND PATCHING

- A. Cutting and Patching, 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 in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

- E. Existing Utility Services and Mechanical, Plumbing, and Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize, or where feasible in Architects opinion, prevent interruption to occupied areas.

- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
 - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 - 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 - 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 - 5. Mechanical, Plumbing and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 - 6. Proceed with patching after construction operations requiring cutting are complete.

- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
 - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. For an assembly, refinish the entire unit. Provide additional coats until patch blends with adjacent surfaces. Except where indicated otherwise, finish sheen and color to match existing.
 - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
 - 6. Floor and Wall Penetrations: Where pipes, conduits, ducts and other items are removed from floors and walls resulting in openings, Contractor responsible for the items removal shall

- patch the resulting opening with materials matching the existing adjacent construction and as required to maintain fire ratings.
7. Demolished Walls: Where walls are removed and recesses in the floor substrate result, the Contractor responsible for removal of the wall shall patch the floor level with the adjacent substrate for subsequent finish floor installation.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.
1. Preinstallation Conferences: Include Owner's construction personnel at preinstallation conferences covering portions of the Work that are to receive Owner's work. Attend preinstallation conferences conducted by Owner's construction personnel if portions of the Work depend on Owner's construction.

END OF SECTION

SECTION 017419

CONSTRUCTION WASTE MANAGEMENT

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Administrative and procedural requirements for construction waste management activities.
 - 1. Salvaging non-hazardous demolition and construction waste.
 - 2. Recycling non-hazardous demolition and construction waste.
 - 3. Disposing of non-hazardous demolition and construction waste.
- B. Related Sections include the following:
 - 1. Section 015000 "Temporary Facilities and Controls".
 - 2. Section 024119 "Selective Structure Demolition".

1.3 DEFINITIONS

- A. Construction and Demolition Waste (CDW): Includes all non-hazardous solid wastes resulting from construction, remodeling, alterations, repair and demolition. Includes material that is recycled, reused, salvaged or disposed as garbage.
- B. Disposal: Removal off-site of CDW and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.
- C. Diversion: Avoidance of CDW to landfill or incineration. Diversion does not include using materials for landfill, alternate daily cover on landfills, or materials used as fuel in waste-to-energy processes.
- D. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitability, corrosiveness, toxicity or reactivity.
- E. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- F. Trash: Any product or material unable to be reused, returned, recycled or salvaged.
- G. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable and reusable material.
- H. Material Stream: A flow of materials coming from a job site into markets for building materials. A material stream should constitute at least 5%, by weight or volume, of total diverted materials. Examples of material streams include deconstructed materials sent to reuse markets, commingled

waste sent to a mixed-waste recycling facility, source separation where each material is sent to a specific facility, manufacturers' or suppliers' take-back of materials, and reuse of deconstructed materials on-site.

- I. Salvage: Recovery of materials for on-site reuse or donation to a third party.
- J. Reuse: Making use of a material without altering its form. Materials can be reused on-site or reused on other projects off-site. Examples include, but are not limited to the following: Grinding of concrete for use as subbase material.
- K. Recycle: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.
- L. Recycling: The process of sorting, cleaning, treating and reconstituting materials for the purpose of using the material in the manufacture of a new product.
- M. Source-Separated CDW Recycling: The process of separating recyclable materials in separate containers as they are generated on the job-site. The separated materials are hauled directly to a recycling facility or transfer station.
- N. Co-mingled CDW Recycling: The process of collecting mixed recyclable materials in one container on-site. The container is taken to a material recovery facility where materials are separated for recycling.
- O. Approved Recycling Facility: Any of the following:
 - 1. A facility that can legally accept CDW materials for the purpose of processing the materials into an altered form for the manufacture of a new product.
 - 2. Material Recovery Facility: A general term used to describe a waste-sorting facility. Mechanical, hand-separation, or a combination of both procedures, are used to recover recyclable materials.

1.4 SUBMITTALS

- A. Construction Waste Management Plan: Submit three (3) copies of plan within 21 days of date established for the Notice to Proceed and prior to the generation of any waste.
- B. Waste Management Report: Concurrent with each Application for Payment, submit three (3) copies of the report.
- C. Submit calculations on end-of-project recycling rates, salvage rates and landfill rates itemized by waste material, demonstrating that a minimum percentage indicated, per LEED MR Credit Construction and Demolition Waste Management of construction wastes were recycled or salvaged and diverted from landfill. Include documentation of recovery rate, waste hauling certificates or receipts, and a brief narrative explaining how and to where each waste type has been diverted.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Achieve end of project rates for salvage/recycling of 75%, in at least four (4) different material streams, of the total construction and demolition material, by volume, per LEED MR Credit Construction and Demolition Waste Management from the landfill by one or a combination of the following activities:

1. Salvage
2. Reuse
3. Co-mingled CDW Recycling
4. Source-separated CDW Recycling
5. Manufacturers' or suppliers' take-back program

B. CDW materials that can be salvaged, reused or recycled include, but are not limited to, the following:

1. Acoustical ceiling tiles
2. Asphalt
3. Cardboard packaging
4. Carpet and carpet pad
5. Gypsum board
6. Concrete
7. Concrete reinforcing steel
8. Brick
9. Concrete Masonry Units (CMU)
10. Drywall
11. Fluorescent lights and ballasts
12. Metals
13. Roofing
14. Door hardware
15. Doors and frames
16. Paint (through hazardous waste outlets)
17. Piping
18. Plumbing fixtures
19. Mechanical equipment
20. Refrigerants
21. Copper wiring
22. Electrical conduit
23. Wood
24. Plastic film (sheeting, shrink wrap, packaging)
25. Windows and glass
26. Insulation
27. Field office waste, including office paper, aluminum cans, glass, plastic, beverage and food containers and office cardboard.

1.6 QUALITY ASSURANCE

- A. Regulatory Requirements: Conduct construction waste management activities in accordance with State of Ohio requirements and all other applicable laws and ordinances.
- B. Pre-construction Waste Management Conference: Schedule and conduct meeting at Project site prior to construction activities.
 1. Attendees: Inform the following individuals, whose presence is required, of date and time of meeting.
 - a. Owner.
 - b. Contractor's superintendent.
 - c. Major subcontractors.
 - d. Other concerned parties.

2. Agenda Items: Review methods and procedures related to waste management including, but not limited to the following:
 - a. Review and discuss waste management plan including responsibilities of Waste Management Coordinator.
 - b. Review requirements for documenting quantities of each type of waste and its disposition.
 - c. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
 - d. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
 - e. Review waste management requirements for each trade.
 3. Minutes: Record discussion. Distribute meeting minutes to all participants within three (3) days.
- C. Implementation: Designate an on-site party responsible for instructing workers and implementing the Construction Waste Management Plan. Distribute copies of the Construction Waste Management Plan to the job site foreman's for each prime contractor and each subcontractor. Include waste management and recycling in worker orientation. Provide on-site instruction on appropriate separation, handling, recycling, and salvaging methods to be used by all parties at the appropriate stages of the work at the site. Include waste management and recycling discussions in pre-fabrication meeting with subcontractors and fabricators. Also include discussion of waste management and recycling in regular job meetings and job safety meetings conducted during the course of work at the site.

1.7 WASTE MANAGEMENT PLAN

- A. General: Develop plan consisting of waste types, quantity by volume, material streams, methods of disposal, handling and transportation procedures. Include separate sections in plan for demolition and construction waste.
- B. Organize the waste management plan with the following information:
 1. Types and estimated quantities, by volume (tonnage), of CDW expected to be generated during demolition and construction.
 2. Identify specific material streams to be utilized.
 3. Proposed methods for CDW salvage, reuse, recycling and disposal during demolition including, but not limited to, one or more of the following:
 - a. Contracting with a deconstruction specialist to salvage materials generated.
 - b. Selective salvage as part of demolition contractor's work.
 - c. Reuse of materials on-site or sale or donation to a third party.
 4. Proposed methods for salvage, reuse, recycling and disposal during construction including, but not limited to, one or more of the following:
 - a. Requiring subcontractors to take their CDW to a recycling facility.
 - b. Contracting with a recycling hauler to haul recyclable CDW to an approved recycling or material recovery facility.
 - c. Processing and reusing materials on-site.
 - d. Self-hauling to a recycling or material recovery facility.
 5. Name of recycling or material recovery facility receiving the CDW.

6. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location on Project site where materials separation will be located.

1.8 WASTE MANAGEMENT REPORT

- A. Waste Management Report: Submit a cumulative waste management report form with each Application for Payment with the following attachments:
 1. A record of the type and quantity, by volume, of each material salvaged, reused, recycled or disposed.
 2. Indicate diversion/recycling hauler or location.
 3. Total quantity of waste recycled as a percentage of total waste.
 4. Disposal Receipts: Copy of receipts issued by a disposal facility for CDW that is disposed in a landfill.
 5. Recycling Receipts: Copy of receipts issued by an approved recycling facility.
 - a. For co-mingled materials, include weight tickets from the recycling hauler or material recovery facility and verification of the recycling rate for co-mingled loads at the facility.
 6. Salvaged Materials Documentation: Types and quantities, by volume, for materials salvaged for reuse on site, sold or donated to a third party.

1.9 WASTE MANAGEMENT RESOURCES

- A. General information contacts regarding construction and demolition waste include but not limited to:
 1. EPA Construction and Demolition (C&D) debris website:
<http://www.epa.gov/apaoswer/non-hw/debris-new/bytype.htm>
 2. Construction Materials Recycling Association:
<http://www.cdrecycling.org>
 3. Construction Industry Compliance Assistance Center:
<http://www.cicacenter.org>

1.10 RECOMMENDED CONSTRUCTION WASTE MANAGEMENT PROVIDERS

- A. The Rosby Companies, Brooklyn Heights, Ohio – (216) 739-2220
- B. Allied Waste Industries, Inc., Cleveland, Ohio – (216) 441-6300 x 3278
- C. Waste Management, Glenwillow, Ohio – (440) 201-1203
- D. Kurtz Brothers, Inc., Independence, Ohio – (216) 986-7000

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 CONSTRUCTION WASTE MANAGEMENT GENERAL

- A. Provide containers for CDW that is to be recycled clearly labeled as such with a list of acceptable and unacceptable materials. The list of acceptable materials must be the same as the materials recycled at the receiving material recovery facility or recycling processor.
- B. The collection containers for recyclable CDW must contain no non-recyclable materials.
- C. Provide containers for CDW that is disposed in a landfill clearly labeled as such.
- D. Use detailed material estimates to reduce risk of unplanned and potentially wasteful cuts.
- E. To the greatest extent possible, include in material purchasing agreements a waste reduction provision requesting that materials and equipment be delivered in packaging made of recyclable material, that they reduce the amount of packaging, that packaging be taken back for reuse or recycling, and to take back all unused product. Insure that subcontractors require the same provisions in their purchase agreements.
- F. Conduct regular visual inspections of dumpsters and recycling bins to remove contaminants.
- G. Do not pulverize materials prior to placing in containers.

3.2 CO-MINGLED RECYCLING

- A. General: Do not put CDW that will be disposed in a landfill into a co-mingled CDW recycling container.

3.3 REMOVAL OF CONSTRUCTION WASTE MATERIALS

- A. Remove CDW materials from project site on a regular basis. Do not allow CDW to accumulate on-site.
- B. Transport CDW materials off Owner's property and legally dispose of them.
- C. Burning of CDW is not permitted.

END OF SECTION

SECTION 017700
CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.
 - 5. Extra materials schedule.
- B. Related Requirements:
 - 1. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 2. Section 017839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
 - 3. Section 017900 "Demonstration and Training" for requirements for instructing Owner's personnel.
 - 4. Divisions 02 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBMITTALS

- A. Refer to body of section for required submittals.

1.4 SUBSTANTIAL COMPLETION PROCEDURES

- A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.
- B. Submittals Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 3. Submit closeout submittals specified in individual Divisions 02 through 33 Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 4. Submit maintenance material submittals specified in individual Divisions 02 through 33 Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
 - a. Refer to extra materials list at end of Section. Submit copy of extra materials schedule endorsed and dated by the Owner.
 5. Submit test/adjust/balance records.
 6. Submit sustainable design submittals required in Division 01 sustainable design requirements Section and in individual Division 02 through 33 Sections when applicable.
 7. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- C. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
 2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 3. Complete startup and testing of systems and equipment.
 4. Perform preventive maintenance on equipment used prior to Substantial Completion.
 5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Division 01 Section "Demonstration and Training."
 6. Advise Owner of changeover in heat and other utilities.
 7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
 8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 9. Complete final cleaning requirements, including touchup painting.
 10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.
1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

2. Results of completed inspection will form the basis of requirements for final completion.

1.5 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
 1. Submit a final Application for Payment according to Division 01 Section "Payment Procedures."
 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list). Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
 4. Submit pest-control final inspection report if applicable.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.6 SUBMITTAL OF PROJECT WARRANTIES

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

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

2.2 EXTRA MATERIALS

- A. Furnish extra materials, tools, spare parts and similar items identified in Divisions 02 through 49 Sections and/or Extra Materials Schedule located in Part 3 of this Section.
- B. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
- C. Extra materials shall be from the same production run and/or batch mix as installed items.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove snow and ice to provide safe access to building.
 - f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - h. Sweep concrete floors broom clean in unoccupied spaces.

- i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.
 - j. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter on inspection.
 - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Division 01 Section "Temporary Facilities and Controls." Prepare written report.

3.2 ATTACHMENTS

- A. Contractor Substantial Completion Checklist: Complete and submit attached Contractor Substantial Completion Checklist form with request for substantial completion inspection.

CONTRACTOR SUBSTANTIAL COMPLETION CHECKLIST

Project No. _____ Project Name _____

Contract Type _____ Contractor _____

Items listed must be complete prior to request for substantial completion inspection

Description	Date Completed or Transmitted to Owner / Architect if Applicable	Owner Acknowledgement
Certificates of Release		
Life Safety Inspection/Occupancy Certificate		
Certificate of Elevator Inspection		
Certificate of Pressure Piping		
Certificate of Piping Purification		
Certificate of Underground Water Main Flush		
Certificate of Boiler Inspection		
Certificate of Plumbing Inspection		
Certificate of Medical Gas Inspection		
Certificate of Health Department Inspection		
As Built Documents		
Operating / Maintenance Manuals		
Warranties		
Maintenance Bonds		
Maintenance Service Agreements		
Extra Materials, Tools, Spare Parts		
Balance Reports		
Preventative Maintenance on Equipment Used Prior to Substantial Completion		
Instructed Owner's Personnel in Operation of Equipment		
Submitted Demonstration and Training Video		
Returned Owner's Keys		
Contractor's Punch List		

END OF SECTION

SECTION 017823

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Emergency manuals.
 - 3. Operation manuals for systems, subsystems, and equipment.
 - 4. Product maintenance manuals.
 - 5. Systems and equipment maintenance manuals.
- B. Related Requirements:
 - 1. Section 013300 "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
 - 2. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

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

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Architect and when applicable, the Commissioning Authority will comment on whether content of operations and maintenance submittals are acceptable.
 - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.
- C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 30 days before commencing demonstration and training. Architect and when applicable Commissioning Authority will return copy with comments, if required.
 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 10 days of receipt of Architect's and Commissioning Authority's comments and prior to commencing demonstration and training.
- D. Submittal Procedures: Submit Operation and Maintenance Data related to mechanical, plumbing and electrical systems directly to applicable consulting engineer with transmittal to Architect.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

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

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

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

2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Construction Manager.
 7. Name and contact information for Architect.
 8. Name and contact information for Commissioning Authority.
 9. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 10. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
- D. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
 2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

2.3 EMERGENCY MANUALS

- A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
 2. Emergency instructions.
 3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.
 2. Flood.
 3. Gas leak.
 4. Water leak.
 5. Power failure.
 6. Water outage.
 7. System, subsystem, or equipment failure.
 8. Chemical release or spill.

- C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.
- D. Emergency Procedures: Include the following, as applicable:
 - 1. Instructions on stopping.
 - 2. Shutdown instructions for each type of emergency.
 - 3. Operating instructions for conditions outside normal operating limits.
 - 4. Required sequences for electric or electronic systems.
 - 5. Special operating instructions and procedures.

2.4 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 - 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 - 2. Performance and design criteria if Contractor has delegated design responsibility.
 - 3. Operating standards.
 - 4. Operating procedures.
 - 5. Operating logs.
 - 6. Wiring diagrams.
 - 7. Control diagrams.
 - 8. Piped system diagrams.
 - 9. Precautions against improper use.
 - 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
 - 1. Product name and model number. Use designations for products indicated on Contract Documents.
 - 2. Manufacturer's name.
 - 3. Equipment identification with serial number of each component.
 - 4. Equipment function.
 - 5. Operating characteristics.
 - 6. Limiting conditions.
 - 7. Performance curves.
 - 8. Engineering data and tests.
 - 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
 - 1. Startup procedures.
 - 2. Equipment or system break-in procedures.
 - 3. Routine and normal operating instructions.
 - 4. Regulation and control procedures.
 - 5. Instructions on stopping.
 - 6. Normal shutdown instructions.
 - 7. Seasonal and weekend operating instructions.
 - 8. Required sequences for electric or electronic systems.
 - 9. Special operating instructions and procedures.

- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
 - 1. Product name and model number.
 - 2. Manufacturer's name.
 - 3. Color, pattern, and texture.
 - 4. Material and chemical composition.
 - 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
 - 1. Inspection procedures.
 - 2. Types of cleaning agents to be used and methods of cleaning.
 - 3. List of cleaning agents and methods of cleaning detrimental to product.
 - 4. Schedule for routine cleaning and maintenance.
 - 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and

cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.

- C. **Manufacturers' Maintenance Documentation:** Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.

- D. **Maintenance Procedures:** Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.

- E. **Maintenance and Service Schedules:** Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. **Scheduled Maintenance and Service:** Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. **Maintenance and Service Record:** Include manufacturers' forms for recording maintenance.

- F. **Spare Parts List and Source Information:** Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

- G. **Maintenance Service Contracts:** Include copies of maintenance agreements with name and telephone number of service agent.

- H. **Warranties and Bonds:** Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
 - 1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. **Emergency Manual:** Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

- B. **Product Maintenance Manual:** Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

- C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
 - 1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
 - 2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

- D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 - 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

- E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 - 1. Do not use original project record documents as part of operation and maintenance manuals.
 - 2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."

- F. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION

SECTION 017839

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Product Data.
- B. Related Requirements:
 - 1. Section 017700 "Closeout Procedures" for general closeout procedures.
 - 2. Section 017823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
 - 3. Divisions 02 through 33 Sections for specific requirements for project record documents of the Work in those Sections.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up record prints.
- B. Record Product Data: Submit one paper copy and annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Print (As-Built Drawings): Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether

individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.

- a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. Cross-reference record prints to corresponding archive photographic documentation.
2. Content: Types of items requiring marking include, but are not limited to, the following:
- a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.
 - e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Shop Drawings: Record shop drawings include, but are not limited to the following:

1. Precast drawings.
2. MEP coordination drawings.
 - a. Upon completion of the work, electronically update the coordination drawings with all changes associated with Construction Change Directives, Proposal Requests, Request for Information, or any other as-built revisions that have occurred throughout the duration of the project.
 - b. In addition to the above information, MEP Coordination Drawings shall comply with the following:
 - 1) Accurately record valve tag numbers and locations on the Record MEP Coordination Drawings for work of Divisions: 21, 22, and 23.
 - c. Prior to submission of MEP Coordination Drawings as Record Shop Drawings, the information shall be separated and organized onto individual sheets on the most current floor plan background as follows:

- 1) Storm and sanitary (waste and vent) sewer piping and specialties.
 - 2) Domestic hot and cold-water piping, valves, and specialties.
 - 3) Natural Gas piping, valves, and specialties.
 - 4) Medical gas piping, valves, and specialties.
 - 5) Chilled water piping, valves, and specialties.
 - 6) Heating hot water piping, valves, and specialties.
 - 7) Metal ductwork, dampers, and specialties.
3. Fire suppression drawings.
- a. Accurately record valve tag numbers and locations on the Record Shop Drawings.
 - b. Refer to Division 21 for additional requirements.
4. Fire alarm drawings.
5. Building automation drawings.
6. Security drawings.
7. Permit sets from local authority having jurisdiction.

2.2 RECORD PRODUCT DATA

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

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION

SECTION 017900

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
 - 1. Demonstration of operation of systems, subsystems, and equipment.
 - 2. Training in operation and maintenance of systems, subsystems, and equipment.
 - 3. Demonstration and training videotapes.
- B. Related Sections include the following:
 - 1. Divisions 02 through 33 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 01 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to demonstration and training including, but not limited to, the following:
 - 1. Inspect and discuss locations and other facilities required for instruction.
 - 2. Review and finalize instruction schedule and verify availability of educational materials, instructors' personnel, audiovisual equipment, and facilities needed to avoid delays.
 - 3. Review required content of instruction.
 - 4. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

1.4 COORDINATION

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.
- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect.

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
- B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following:
 - 1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
 - a. System, subsystem, and equipment descriptions.
 - b. Performance and design criteria if Contractor is delegated design responsibility.
 - c. Operating standards.
 - d. Regulatory requirements.
 - e. Equipment function.
 - f. Operating characteristics.
 - g. Limiting conditions.
 - h. Performance curves.
 - 2. Documentation: Review the following items in detail:
 - a. Emergency manuals.
 - b. Operations manuals.
 - c. Maintenance manuals.
 - d. Project Record Documents.
 - e. Identification systems.
 - f. Warranties and bonds.
 - g. Maintenance service agreements and similar continuing commitments.
 - 3. Emergencies: Include the following, as applicable:
 - a. Instructions on meaning of warnings, trouble indications, and error messages.
 - b. Instructions on stopping.
 - c. Shutdown instructions for each type of emergency.
 - d. Operating instructions for conditions outside of normal operating limits.
 - e. Sequences for electric or electronic systems.
 - f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:
 - a. Startup procedures.
 - b. Equipment or system break-in procedures.
 - c. Routine and normal operating instructions.
 - d. Regulation and control procedures.
 - e. Control sequences.
 - f. Safety procedures.
 - g. Instructions on stopping.
 - h. Normal shutdown instructions.
 - i. Operating procedures for emergencies.
 - j. Operating procedures for system, subsystem, or equipment failure.
 - k. Seasonal and weekend operating instructions.
 - l. Required sequences for electric or electronic systems.
 - m. Special operating instructions and procedures.
5. Adjustments: Include the following:
 - a. Alignments.
 - b. Checking adjustments.
 - c. Noise and vibration adjustments.
 - d. Economy and efficiency adjustments.
6. Troubleshooting: Include the following:
 - a. Diagnostic instructions.
 - b. Test and inspection procedures.
7. Maintenance: Include the following:
 - a. Inspection procedures.
 - b. Types of cleaning agents to be used and methods of cleaning.
 - c. List of cleaning agents and methods of cleaning detrimental to product.
 - d. Procedures for routine cleaning
 - e. Procedures for preventive maintenance.
 - f. Procedures for routine maintenance.
 - g. Instruction on use of special tools.
8. Repairs: Include the following:
 - a. Diagnosis instructions.
 - b. Repair instructions.
 - c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - d. Instructions for identifying parts and components.
 - e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.

- B. Set up instructional equipment at instruction location.

3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
 - 1. Schedule training with Owner, with at least fourteen days' advance notice.
- D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
- E. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

END OF SECTION

SECTION 018113.14

SUSTAINABLE DESIGN REQUIREMENTS
LEED v4 BD+C: SCHOOLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general requirements and procedures for compliance with certain prerequisites and credits needed for Project to obtain "LEED Version 4 for Building Design and Construction: Schools" (LEED v4 BD+C: Schools) Silver certification based on USGBC's LEED v4 BD+C: Schools.
 - 1. Specific requirements for LEED are also included in other Sections.
 - 2. Some LEED prerequisites and credits needed to obtain LEED certification depend on product selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criteria to evaluate substitution requests and comparable product requests.
 - 3. A copy of the LEED Project checklist is attached at the end of this Section for information only.
 - a. Some LEED prerequisites and credits needed to obtain the indicated LEED certification depend on the Architect's design and other aspects of the Project that are not part of the Work of the Contract.

1.3 DEFINITIONS

- A. LEED: USGBC's "LEED Version 4 for Building Design and Construction: Schools."
 - 1. Definitions that are a part of "LEED Version 4 for Building Design and Construction: Schools" (LEED v4 BD+C: Schools) apply to this Section.
- B. Chain-of-Custody Certificates: Certificates signed by manufacturers certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001. Certificates shall include evidence that manufacturer is certified for chain of custody by an FSC-accredited certification body.
- C. Product (permanently installed building product): An item that arrives on the project site either as a finished element ready for installation or as a component to another item assembled on-site. The product unit is defined by the functional requirement for use in the project; this includes the physical components and services needed to serve the intended function of the permanently installed building product. In addition, similar products within a specification can each contribute as separate products.
- D. Regional Materials: Materials that have been extracted, harvested, or recovered, as well as manufactured, within 100 miles of Project site. If only a fraction of a product or material is

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

- E. Recycled Content: The recycled content value of a material assembly shall be determined by weight. The recycled fraction of the assembly is then multiplied by the cost of assembly to determine the recycled content value.
 - 1. "Postconsumer" material is defined as waste material generated by households or by commercial, industrial, and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
 - 2. "Preconsumer" material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials, such as rework, regrind, or scrap, generated in a process and capable of being reclaimed within the same process that generated it.

1.4 LEED PROJECT MEETINGS

- A. Preconstruction Conference: Conduct conference to review LEED requirements and action plans for meeting requirements.
- B. Conduct regular occurring meetings to review LEED requirements and action plans for meeting requirements.

1.5 CONSTRUCTION MANAGER'S ADMINISTRATIVE REQUIREMENTS

- A. Respond to questions and requests from Architect and the USGBC regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the USGBC has made its determination on the Project's LEED certification application. Document responses as informational submittals.
- B. Submit documentation to USGBC and respond to questions and requests from USGBC regarding LEED credits that are the responsibility of the Contractor, that depend on product selection or product qualities, or that depend on Contractor's procedures until the USGBC has made its determination on the Project's LEED certification application.
 - 1. Document correspondence with USGBC as informational submittals.

1.6 SUBMITTALS

- A. General: Submit additional sustainable design submittals required by other Specification Sections.
- B. Sustainable design submittals are in addition to other submittals.
 - 1. If submitted item is identical to that submitted to comply with other requirements, include an additional copy with other submittal as a record copy of compliance with indicated LEED requirements instead of separate sustainable design submittal. Mark additional copy "Sustainable design submittal."
- C. Sustainable Design Documentation Submittals:

1. Construction Activity Pollution Prevention. Provide monthly documentation of the erosion and sedimentation control plan throughout construction with dated photography. Describe corrective action if problems occur.
2. Heat Island Reduction. Provide manufacturer's documentation for products that comply with LEED requirements for solar reflectance (SR) or solar reflectance index (SRI) or paving permeability for all paving surfaces and roofing materials.
3. Documentation complying with Section 017419 "Construction Waste Management and Disposal."
4. Properly completed Material Criteria Worksheet, provided as part of this section, shall be submitted for every product in Divisions 3-10, 316000, 321000, 323000, and 329000 and as indicated otherwise to provide the following information:
 - a. Environmental Product Declarations complying with LEED requirements.
 - b. Documentation for products that comply with LEED requirements for multi-attribute optimization.
 - 1) Include documentation for regional materials, indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material and costs of regional materials.
 - c. Sustainability reports for products that comply with LEED requirements for raw material and source extraction reporting.
 - d. Documentation for products that comply with LEED requirements for leadership extraction practices. Include the following:
 - 1) Product data and certification letter from product manufacturers, indicating participation in an extended producer responsibility program and statement of costs.
 - 2) Product data and certification for bio-based materials, indicating that they comply with requirements. Include statement of costs.
 - 3) Product data and chain-of-custody certificates for products containing certified wood. Include statement of costs.
 - 4) Receipts for salvaged and refurbished materials used for Project, indicating sources and costs.
 - 5) Product data and certification letter from product manufacturers, indicating percentages by weight of postconsumer and preconsumer recycled content for products having recycled content. Include statement of costs.
 - 6) Documentation for regional materials, indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material and costs of regional materials.
 - e. Material ingredient reports for products that comply with LEED requirements for material ingredient reporting.
 - f. Documentation for products that comply with LEED requirements for material ingredient optimization.
 - g. Documentation for products that comply with LEED requirements for product manufacturer supply chain optimization.
 - 1) Include documentation for regional materials, indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material and costs of regional materials.
 - h. Product data for all adhesives and sealants used inside the weatherproofing system, indicating VOC content and laboratory test reports showing compliance with requirements for low-emitting materials.

- i. Product data for all paints and coatings used inside the weatherproofing system, indicating VOC content and laboratory test reports showing compliance with requirements for low-emitting materials.
 - j. Laboratory test reports for flooring, indicating compliance with requirements for low-emitting materials.
 - k. Laboratory test reports for products containing composite wood or agrifiber products or wood glues, indicating compliance with requirements for low-emitting materials.
 - l. Laboratory test reports for ceilings, walls, and thermal insulation, indicating compliance with requirements for low-emitting materials.
5. Construction Indoor-Air-Quality (IAQ) Management
- a. Construction IAQ management plan.
 - b. Product data for temporary filtration media.
 - c. Product data for filtration media used during occupancy.
 - d. Construction Documentation: A minimum of six photographs at three different times during the construction period, along with a brief description of the SMACNA approach employed, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.
6. IAQ Assessment
- a. Signed statement describing the building air flush-out procedures, including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
 - b. Product data for filtration media used during flush-out and occupancy.
 - c. Report from testing and inspecting agency indicating results of IAQ testing and documentation showing compliance with IAQ testing procedures and requirements.
- D. Project Materials Cost Data: At the time the schedule of values is submitted and approved, provide a statement indicating total cost for materials, including taxes and delivery, used for the Project. Costs exclude labor, overhead, and profit. Include breakout of costs for the following categories of items:
1. Plumbing.
 2. Mechanical.
 3. Electrical.
 4. Specialty items, such as elevators and equipment.
 5. Furniture.
- Provide monthly updates, or as needed, to address changes during construction.
- E. Sustainable Design Action Plans: Provide preliminary submittals within 30 days of date established for the Notice to Proceed indicating how the following requirements will be met:
1. List of proposed products with Environmental Product Declarations.
 2. List of proposed products complying with requirements for multi-attribute optimization.
 3. List of proposed products complying with requirements for raw material and source extraction reporting.
 4. List of proposed products complying with requirements for leadership extraction practices.
 5. List of proposed products complying with requirements for material ingredient reporting.
 6. List of proposed products complying with requirements for material ingredient optimization.
 7. List of proposed products complying with requirements for product manufacturer supply chain optimization.
 8. Waste management plan complying with Section 017419 "Construction Waste Management and Disposal."

9. Construction IAQ management plan.

F. Sustainable Design Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with sustainable design action plans.

1.7 QUALITY ASSURANCE

A. LEED Coordinator: Engage an experienced LEED-accredited professional to coordinate LEED requirements. LEED coordinator may also serve as waste management coordinator.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Provide products and procedures necessary to obtain LEED credits required in this Section. Although other Sections may specify some requirements that contribute to these LEED credits, the Contractor shall provide additional materials and procedures necessary to obtain LEED credits indicated.

B. At least 20 different products from at least five different manufacturers shall have Environmental Product Declarations that comply with LEED requirements. Industry-wide (generic) Environmental Product Declarations shall be valued as one-half of a product.

C. At least 50 percent, by cost, of the permanently installed products for the Project shall comply with LEED requirements for multi-attribute optimization.

D. At least 20 different products from at least five different manufacturers shall have publicly released reports that comply with LEED requirements for raw material source and extraction reporting. Self-declared reports by manufacturers shall be valued as one-half of a product.

E. At least 20 different products from at least five different manufacturers shall comply with LEED requirements for material ingredient reporting.

F. At least 25 percent, by cost, of the permanently installed products for the Project shall comply with LEED requirements for material ingredient optimization.

G. At least 25 percent, by cost, of the permanently installed products for the Project shall comply with LEED requirements for product manufacturer supply chain optimization.

H. Not less than 25 percent of building materials, by cost, shall comply with LEED requirements for leadership extraction practices.

1. Structure and enclosure materials shall not be more than 30 percent, by cost, of the materials used to comply with this requirement.

2.2 LOW-EMITTING MATERIALS

A. Paints and Coatings: For field applications that are inside the weatherproofing system, paints and coatings shall comply with VOC content limits of the South Coast Air Quality Management District (SCAQMD) Rule 1113 OR the California Resources Board (CARB) 2007.

- B. Paints and Coatings: For field applications that are inside the weatherproofing system, 90 percent of paints and coatings shall comply with the 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."
- C. Adhesives and Sealants: For field applications that are inside the weatherproofing system, adhesives and sealants shall comply with VOC content limits of the South Coast Air Quality Management District (SCAQMD) Rule 1168.
- D. Adhesives and Sealants: For field applications that are inside the weatherproofing system, 90 percent of adhesives and sealants shall comply with the 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."
- E. Flooring: Flooring shall comply with the 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" or are inherently non-emitting.
- F. Composite Wood: Composite wood, agrifiber products, and adhesives shall be made using ultra-low-emitting formaldehyde (ULEF) resins as defined in the California Air Resources Board's "Airborne Toxic Control Measure to Reduce Formaldehyde Emissions from Composite Wood Products" or shall be made with no added formaldehyde (NAUF).
- G. Ceilings, Walls, and Thermal Insulation: Ceilings, walls, and thermal insulation shall comply with the 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" or are inherently non-emitting.

PART 3 - EXECUTION

3.1 NONSMOKING BUILDING

- A. Smoking is not permitted within the building or within 25 feet of entrances, operable windows, or outdoor-air intakes.

3.2 CONSTRUCTION ACTIVITY POLLUTION PREVENTION

- A. Implement erosion and sedimentation control as detailed on Drawings (C-Series) and additional requirement to comply with the requirements of the 2012 U.S. Environmental Protection Agency Construction General Permit.
- B. Document erosion and sediment control during construction with dated photography of erosion and sediment control measures also provide local governing authority reports confirming compliance with local regulations.

3.3 CONSTRUCTION WASTE MANAGEMENT

- A. Comply with Section 017419 "Construction Waste Management and Disposal."

3.4 CONSTRUCTION IAQ MANAGEMENT

- A. Comply with SMACNA's "SMACNA IAQ Guideline for Occupied Buildings under Construction."
1. If Owner authorizes use of permanent heating, cooling, and ventilating systems during construction period as specified in Section 015000 "Temporary Facilities and Controls," install MERV 8 filter media at each return-air inlet for the air-handling system used during construction.
 2. Replace air filters immediately prior to occupancy.

3.5 IAQ ASSESSMENT

- A. Air-Quality Testing: Contractor shall engage testing agency to perform the following:
1. Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the EPA's "Compendium of Methods for the Determination of Air Pollutants in Indoor Air," and as additionally detailed in the USGBC's "LEED Reference Guide for Building Design and Construction."
 2. Demonstrate that the contaminant maximum concentrations listed below are not exceeded:
 - a. Formaldehyde: 27 ppb.
 - b. Particulates (PM10): 50 micrograms/cu. m.
 - c. Ozone: 0.075 ppm, according to ASTM D 5149.
 - d. Total Volatile Organic Compounds: 500 micrograms/cu. m.
 - e. 4-Phenylcyclohexene (4-PH): 6.5 micrograms/cu. m.
 - f. Carbon Monoxide: 9 ppm and no greater than 2 ppm above outdoor levels.
 - g. Target Chemicals in California Department of Public Health "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Table 4-1 (except formaldehyde): Allowable concentrations in California Department of Public Health "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers," Table 4-1.
 3. For each sampling point where the maximum concentration limits are exceeded, take corrective action until requirements have been met.
 4. Air-sample testing shall be conducted as follows:
 - a. All measurements shall be conducted prior to occupancy but during normal occupied hours, and with building ventilation system starting at the normal daily start time and operated at the minimum outside-air flow rate for the occupied mode throughout the duration of the air testing.
 - b. Building shall have all interior finishes installed, including, but not limited to, millwork, doors, paint, carpet, and acoustic tiles. Nonfixed furnishings, such as workstations and partitions, are encouraged, but not required, to be in place for the testing.
 - c. Number of sampling locations varies depending on the size of building and number of ventilation systems. For each portion of building served by a separate ventilation system, the number of sampling points shall not be less than one per 5000 sq. ft. [For large open spaces, one sampling point per 50,000 sq. ft. may be used.]
 - d. Air samples shall be collected between 3 and 6 feet from the floor to represent the breathing zone of occupants, and over a minimum four-hour period.

3.6 LEED DOCUMENTATION FORMS

- A. Material Criteria Worksheet (Sample).
- B. LEED Version 4, registered project checklist. This template indicates each attempted LEED credit specific for the project.

END OF SECTION



MATERIAL CRITERIA WORKSHEET

Project Name: Steubenville High School STEM Building **Project Number:** 21042.000

Product: **Specification #:**

Manufacturer:

MATERIAL COST: *(Including taxes and cost of transport. Do NOT include labor or equipment)*

SOURCING INFORMATION

Is the product, or fraction thereof, extracted, manufactured, AND purchased within 100 mi (radius) of the project site? Yes No
If yes, provide document.

420 N 4th St, Steubenville, OH 43952

PRODUCT DISCLOSURE

Does the product have an Environmental Product Disclosure (EPD)? Yes No
If yes, provide document.

Does the manufacturer have a Corporate Sustainability Report which includes environmental impacts of extraction operations and activities? Yes No
If yes, provide document.

EXTRACTION PRACTICES *(select all that apply)*

Does the manufacturer have an extended producer responsibility take-back or recycling program for the product? Yes No
If yes, provide document.

Bio-Based Material: Yes No
Percent of product meeting Sustainable Agriculture Network Standard _____ %
If yes, provide document.

Wood Product: Yes No
Percent of FSC Certified Wood _____ %
Chain-of-Custody Certificate Number # _____
Chain-of-Custody Certificate Number for Millworker # _____
If yes, provide document.

Material Reuse: Yes No
Percent Salvaged or Reused _____ %
If yes, provide documentation of origin

Recycled Content: Yes No
Percent Pre-Consumer _____ %
Percent Post-Consumer _____ %
If yes, provide document.

MATERIAL CRITERIA WORKSHEET

Project Name: Steubenville High School STEM Building **Project Number:** 21042.000

Product: **Specification #:**

Manufacturer:

INGREDIENT REPORTING *(choose only one below)*

- | | | |
|---|------------------------------|-----------------------------|
| Does the product have a Health Product Declaration (HPD)? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Does the product have a Chemical Abstract Service Registration Number? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Does the product meet the GreenScreen v1.2 Benchmark? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Is the product Cradle-to-Cradle Certified? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Does the product have a Declare label, disclosed down to 1000 ppm? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Does the product contain ingredients listed on the REACH Authorization or Candidate List? | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
- If yes, provide document.

VOC COMPLIANCE *(select all that apply)*

- Is the product inherently nonemitting? *(ie: stone, ceramic, powder-coated metals, plated or anodized metal, glass, concrete, clay brick, and unfinished or untreated solid wood flooring)*
- Yes No
- Product complies with California Department of Public Health (CDPH) Standard Method v1.1-2010.
- Yes No
If yes, provide document.
- Wet-applied Adhesive and Sealant products have VOC levels below the South Coast Air Quality Management District (SCAQMD) Rule 1168.
- Volume of product installed _____ liters
- Wet-applied Paint and Coating products have VOC levels below the South Coast Air Quality Management District (SCAQMD) Rule 1113 -OR- below the California Air Resources Board (CARB) 2007.
- Volume of product installed _____ liters
- Composite Wood products meet requirements for ultra-low-emitting formaldehyde (ULEF) resins or no added formaldehyde (NAUF) resins.
- ULEF NAUF
If applicable, provide document.
- Exterior applied products have VOC levels below the South Coast Air Quality Management District (SCAQMD) Rule 1168 -OR- below the California Air Resources Board (CARB) 2007.
- Volume of product installed _____ liters
- Batt insulation products contain no added formaldehyde
- Yes No



LEED v4 for BD+C: Schools
Project Checklist

Project Name: Steubenville High School STEM Building
Date: 5/20/2022 Issued for Bid and Permit

Y ? N

1		Credit	Integrative Process	1
4	2	9	Location and Transportation	15
		x	Credit LEED for Neighborhood Development Location	15
1			Credit Sensitive Land Protection	1
	2		Credit High Priority Site	2
2		3	Credit Surrounding Density and Diverse Uses	5
	4		Credit Access to Quality Transit	4
	1		Credit Bicycle Facilities	1
	1		Credit Reduced Parking Footprint	1
1			Credit Green Vehicles	1
5	3	4	Sustainable Sites	12
Y			Prereq Construction Activity Pollution Prevention	Required
Y			Prereq Environmental Site Assessment	Required
1			Credit Site Assessment	1
	2		Credit Site Development - Protect or Restore Habitat	2
	1		Credit Open Space	1
		3	Credit Rainwater Management	3
	2		Credit Heat Island Reduction	2
1			Credit Light Pollution Reduction	1
	1		Credit Site Master Plan	1
1			Credit Joint Use of Facilities	1
5	3	4	Water Efficiency	12
Y			Prereq Outdoor Water Use Reduction	Required
Y			Prereq Indoor Water Use Reduction	Required
Y			Prereq Building-Level Water Metering	Required
2			Credit Outdoor Water Use Reduction	2
2	3	2	Credit Indoor Water Use Reduction	7
		2	Credit Cooling Tower Water Use	2
1			Credit Water Metering	1
13	3	9	Energy and Atmosphere	31
Y			Prereq Fundamental Commissioning and Verification	Required
Y			Prereq Minimum Energy Performance	Required
Y			Prereq Building-Level Energy Metering	Required
Y			Prereq Fundamental Refrigerant Management	Required
6			Credit Enhanced Commissioning	6
3	3	4	Credit Optimize Energy Performance	16
1			Credit Advanced Energy Metering	1
2			Credit Demand Response	2
		3	Credit Renewable Energy Production	3
1			Credit Enhanced Refrigerant Management	1
		2	Credit Green Power and Carbon Offsets	2

5	0	8	Materials and Resources	13
Y			Prereq Storage and Collection of Recyclables	Required
Y			Prereq Construction and Demolition Waste Management Planning	Required
		5	Credit Building Life-Cycle Impact Reduction	5
1		1	Credit Building Product Disclosure and Optimization - Environmental Product Declarations	2
1		1	Credit Building Product Disclosure and Optimization - Sourcing of Raw Materials	2
1		1	Credit Building Product Disclosure and Optimization - Material Ingredients	2
2			Credit Construction and Demolition Waste Management	2
9	3	4	Indoor Environmental Quality	16
Y			Prereq Minimum Indoor Air Quality Performance	Required
Y			Prereq Environmental Tobacco Smoke Control	Required
Y			Prereq Minimum Acoustic Performance	Required
2			Credit Enhanced Indoor Air Quality Strategies	2
2	1		Credit Low-Emitting Materials	3
1			Credit Construction Indoor Air Quality Management Plan	1
2			Credit Indoor Air Quality Assessment	2
1			Credit Thermal Comfort	1
1	1		Credit Interior Lighting	2
		3	Credit Daylight	3
	1		Credit Quality Views	1
		1	Credit Acoustic Performance	1
6	0	0	Innovation	6
5			Credit Innovation	5
1			Credit LEED Accredited Professional	1
2	2	2	Regional Priority http://www.usgbc.org/rpc	4
	1		Credit Regional Priority: High Priority Site	1
1			Credit Regional Priority: Surrounding Density and Diverse Uses	1
		1	Credit Regional Priority: Rainwater Management	
	1		Credit Regional Priority: Renewable Energy Production	
		1	Credit Regional Priority: Building Life-Cycle Impact Reduction	1
1			Credit Regional Priority: Enhanced Indoor Air Quality Strategies	1

50 16 40 TOTALS Possible Points: **110**

Certified: 40 to 49 points, Silver: 50 to 59 points, Gold: 60 to 79 points, Platinum: 80 to 110

SECTION 019100

COMMISSIONING

PART 1 - GENERAL

1.1 SUMMARY

- A. This project is to be commissioned. The commissioning process, which the Commissioning Team including all Contractors is responsible to execute, is defined herein and in related sections. The commissioning process will be directed by the Commissioning Authority (CxA) with the participation of all Contractors.
- B. This section includes requirements for commissioning that are defined in the particular specification sections, including the following:
 - 1. Each Contractor shall participate in commissioning meetings.
 - 2. Each Contractor shall Review Owner's Commissioning Plan, Owner Project Requirements (OPR), and Basis of Design (BoD) documentation.
 - 3. Each Contractor shall complete Construction Checklists and functional performance testing procedures using CxA standard forms provided by the CxA. Initial sample of forms are provided as part of this project manual; electronic copy of forms will be available per request of the Architect/Engineer (AE)/Construction Manager using the commissioning documentation data base.
 - 4. Each Contractor shall participate in the performance of functional performance tests as specified herein and in related sections.
- C. Description and Application of Commissioning on This Project:
 - 1. Commissioning is a validation process to document that a particular product, assembly, system, process, or facility meets and will continue to meet predetermined requirements and criteria.
 - 2. Commissioning will be applied on this project to specific systems and components of the building as stipulated in this section and in the product specifications, and will be based on the requirements documented in the OPR, BoD, and construction documents prepared by the A/E.
 - 3. The commissioning process does not take away from or reduce the responsibility of the system designers or installing Contractors/Sub-Contractors to provide a finished and fully functioning product.
- D. The overall goal of the commissioning process is to verify that the completed project was designed and constructed to meet the requirements of the Owner and user of the project. Commissioning during the construction phase is intended to achieve the following objectives:
 - 1. Ensure applicable equipment and systems are installed properly, receive adequate operational checkout and start up by installing contractors.
 - 2. Ensure that installed equipment and systems meet owner's design and operational requirements.
 - 3. Verify and document proper installation and performance of equipment and systems.
 - 4. Ensure that Operation and Maintenance (O&M) and System Manual documentation submitted by the contractors is complete.
 - 5. Ensure owner's operating personnel are adequately trained.

09-15/03-15

- E. All CxA documentation shall be published, managed, and recorded using an online database controlled by the CxA. The Contractor shall participate and manage their specific commissioning related documentation using this software.

1.2 DEFINITIONS

- A. Acceptable Performance: Complying with requirements and satisfying the Owner's Project Requirements and Basis of Design documentation.
- B. Acceptance Phase - Phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occur.
- C. Architect / Engineer (A/E) - The prime consultant and sub-consultants who comprise the design team, generally the mechanical designer/engineer and the electrical designer/engineer.
- D. Basis of Design (BoD) Documents: Documents, prepared by the A/E, that record the foundation for calculations, decisions, schemes, and product selections; describe in detail the measurable performance requirements to achieve the Owner's program; and satisfy applicable regulatory requirements, standards, and guidelines.
- E. Commissioning Authority (CxA) - An agent, not otherwise responsible for the design or the construction. The CxA directs and coordinates the day-to-day commissioning activities. The CxA does not take an oversight role like the CM/GC. The CxA is part of the commissioning team and shall report directly to the Owner.
- F. Commissioning Plan: The document that outlines the organization and schedule of commissioning tasks and allocates resources for the performance and documentation of commissioning processes.
- G. Commissioning Schedule: Written schedule for commissioning. This schedule is to be fully integrated into and accounted for in the overall project schedule by the Contractor(s).
- H. Commissioning Team: Consists of Owner's Agent (OA), the CxA, all Contractors, and subcontractors who will perform testing.
- I. Construction Check: The process of validating that the installation conditions of a system, subsystem, or component are appropriate to allow startup and functional performance testing to proceed.
- J. Construction Checklist (CC) and Startup Checklist (SC) - A list of items to inspect and component tests to conduct to verify proper installation of equipment, provided by the CxA to the Contractor/Sub-Contractor. Construction and startup checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation. However, some construction and startup checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three-phase pump motor of a chiller system). Construction and startup checklists augment and are combined with the manufacturer's startup checklist.
- K. Construction Checklists, Pre-Functional and Functional Performance Testing Procedures: Modified checklists and test procedures based on the CxA's standard forms for each system, subsystem, and equipment to be commissioned.

- L. Deferred Functional Tests - FTs that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the test from being performed.
- M. Functional Performance Completion: The date, certified by the Commissioning Team, when functional performance testing, including the associated documents and reports, has been completed.
- N. Functional Performance Test (FT)
 - 1. Test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation.
 - 2. Systems are tested under various modes, such as during high loads, component failures, unoccupied, varying outside air temperatures, fire alarm condition, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state.
 - 3. The CxA develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing Contractors/Sub-Contractors or vendor. FTs are performed after construction and startup checklists, and startups are complete.
- O. Functional Performance Testing: The process of validating the ability of a system, subsystem, or equipment to achieve the OPR and BoD documentation in which the CxA team participates.
- P. Issues Log: The CxA shall prepare an on-going list of items requiring additional information, for non-compliance, for non-conformance, and design deficiencies. Team members are to work to resolve items and these are to be documented.
- Q. Owners Projects Requirements (OPR): Document detailing the functional requirements of the project and the building's use and operation as they relate to the systems to be commissioned.
- R. Pre-functional Testing: The process of validating the ability of a system, sub-system, or equipment to achieve the OPR & BOD prior to actual functional performance testing. This process is completed by the Contractor in order to demonstrate readiness for functional performance testing.
- S. Warranty Period - Warranty period for entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least one year, unless specifically noted otherwise in the Contract Documents and accepted submittals. Equipment that does not initially pass seasonal or deferred functional testing shall have the warranty start date adjusted to date of passing test completion.

1.3 RESPONSIBILITIES

- A. The responsibilities of various parties in the commissioning process are provided in this section. The responsibilities of the Construction Manager (CM) / General Contractor (GC) and Contractor for specific systems, are in associated Division sections. The responsibilities of the (other) Contractors/Sub-Contractors are noted in their specification documents.
- B. Mechanical and Electrical Designers/Engineers (A/E).

1. Perform normal submittal review, construction observation, as-built drawing preparation, records, etc., as contracted.
2. Provide design narrative and sequence documentation requested by the CxA. The designers shall assist (along with the Contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
3. Attend commissioning scoping meetings and other selected commissioning team meetings, as requested.
4. Review and approve Contractor system testing.
5. Participate in the resolution of system deficiencies identified during commissioning, according to the contract documents.
6. Review and approve the O&M manuals.
7. Participate in the resolution of non-compliance, non-conformance and design deficiencies identified during commissioning including warranty-period commissioning.

C. Commissioning Authority (CxA)

1. The CxA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management, means or methods. The CxA may assist with problem-solving non-conformance or deficiencies, but ultimately that responsibility resides with the CM/GC and the A/E.
2. The primary role of the CxA is to develop and coordinate the execution of a testing plan, observe and document performance—which systems are functioning in accordance with the Contract Documents. The Contractors shall provide all tools or the use of tools to start, checkout and functionally test equipment and systems.
3. Coordinates and directs the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines and schedules and technical expertise.
4. Coordinate the commissioning work and, with the CM, ensure that commissioning activities are being scheduled into the master schedule.
5. Plan and conduct a commissioning scoping meeting and other commissioning meetings.
6. Request and review additional information required performing commissioning tasks, including O&M materials, Contractor startup and checkout procedures.
7. Before startup, gather and review the current control sequences and interlocks and work with Contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
8. Concurrent with the A/E reviews, the CxA shall review normal Contractors/Sub-Contractors submittals related to the commissioned equipment for conformance to the Contract Documents as it relates to the commissioning process, to the functional performance of the equipment and adequacy for developing test procedures. The CxA shall notify the CM, PM or A/E as requested, of items missing or areas that are not in conformance with Contract Documents and which require resubmission.
9. Write and distribute construction and startup checklists.
10. Review factory startup plan and develop a startup plan and initial systems checkout plan with Contractors.
11. Perform site visits, as necessary, to observe component and system installations. Attends selected progress meetings and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
12. Review and approve construction and startup checklists completion in conjunction with selected site observation and spot checking.

13. Oversee sufficient startup and initial testing of the control system and verify it is ready to be used.
14. After submittals are approved, write the functional performance test procedures for equipment and systems. This may include control system trending, stand-alone data logger monitoring or manual functional testing.
15. Review contractor testing and reports before scheduling Functional Performance Tests.
16. Maintain a master deficiency and resolution log and a separate testing record. Provide the CM and OA with written progress reports and test results with recommended actions.
17. Review equipment warranties to ensure that the Owner's responsibilities are clearly defined.
18. Oversee and coordinate the training of the Owner's operating personnel by attending 2 sessions.
19. Compile and maintain a commissioning record.
20. Review of the final O&M manuals.
21. Provide a final commissioning report (as described in this section).
22. Coordinate and supervise required seasonal or deferred testing and deficiency corrections.

D. Owner's Agent (OA)

1. Manage the contract of the A/E and of the CM.
2. Arrange the opportunity for facility operating and maintenance personnel to attend various field commissioning activities and field training.
3. Identify any possible warranty items, document and contact the Contractors/Sub-Contractors for follow-up.
4. Ensure that any seasonal or deferred testing and any deficiency issues are identified.

1.4 SUBMITTALS

A. Normal Submittals

1. The CxA will receive a copy of the normal submittals for equipment to be commissioned for their use.
2. The CxA will review normal Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the A/E reviews. Any review comments generated by the CxA will be forwarded to the A/E for their inclusion in the submittal review notes.
3. Contractor's responsibility for deviations in submittals from requirements of the Contract Documents is not relieved by the CxA review.

B. Startup Plan: For each piece of equipment or system for which formal startup is specified in Sections of Divisions 02 through 28 and in this section. Include the following information:

1. Startup schedule dates.
2. Name of firms and individuals required to participate.
3. Detailed startup procedures.
4. Startup data and report forms.

C. Test Equipment Identification List: For each instrument, sorted according to intended use. Include the following information:

1. Manufacturer, model number, and serial number.
2. Calibration certification.
3. Range.

4. Accuracy.
 5. Resolution.
 6. Intended use.
- D. Notice of Readiness: As each system, subsystem, and equipment becomes ready for functional performance testing, the contractor shall notify the Commissioning Team that the system is ready for functional testing and will demonstrate readiness by documenting the successful completion of pre-functional testing and construction checklists.
- E. Certificate of Functional Completeness: Final acceptance procedures test check-off sheets, signed by the CxA and accompanied by the CxA's final report recommending functional completion and approved by the OA.
- F. Qualification Data: For firms and persons part of each contractor's team.

1.5 QUALITY ASSURANCE

- A. Test Engineer Qualifications: Individual experienced in startup and troubleshooting for the systems and equipment specified to be commissioned.
- B. Test Equipment Calibration Requirements: Comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately after instruments have been repaired resulting from being dropped or damage. Affix calibration tags to test instruments. All instruments shall be within one (1) year of last calibration date.

1.6 COORDINATION

- A. Commissioning Scope Meeting: All Contractors shall participate in a scope meeting with the Commissioning Team chaired by the CxA and scheduled by the OA. The purpose of the meeting includes a Commissioning Plan review with discussions of the commissioning schedules, construction check and functional performance test procedures, documentation requirements, and assignment of responsibilities.
- B. Commissioning Coordination Meeting(s): All Contractors will meet on a pre-determined and approved basis by the CxA to review progress on the commissioning work, coordinate scheduling conflicts, and to discuss strategies and processes for upcoming commissioning tasks. The meeting(s) will be chaired by the CxA and will coincide with a regularly scheduled project progress meeting.
- C. Schedule the witnessing of startup and test activities with the CxA. Each Contractor shall notify the OA and the CxA, in writing, at least 14 days before startup and testing activities and indicate data, time, location, and anticipated duration of activity. The OA or the CxA may delay procedures by not more than 48 hours.
- D. The CxA shall inform contractor(s), before startup and functional performance testing begins, about the test procedures and the level of acceptable test results.
- E. The OA will coordinate meetings and conferences according to Division 01 Section "Project Management and Coordination."

- F. Contractor shall monitor, resolve, and respond to issues assigned them by the CxA via the Commissioning Issues Log via the Commissioning Documentation Management Database Referenced herein.

1.7 PREREQUISITES TO SUBSTANTIAL COMPLETION

- A. All Test Adjust and Balance (TAB) work and commissioning must be complete prior to Functional Performance Testing and/or Final Acceptance of the building systems, unless approved in writing by the OA. Exceptions to this include; training performed after occupancy, any required seasonal or approved deferred testing, and (10 month) Warranty Walk.

Items requiring completion for all systems include, but are not limited to:

1. Completed and signed startup, construction checklist, and pre-functional testing documentation.
 2. Requested trend log data.
 3. Submission of final approved TAB report prior to functional testing.
 4. Completion of all functional testing.
 5. Required training of Owner personnel completed and approved.
 6. Submission of the approved O&M and/or Systems Manuals.
 7. All identified deficiencies and/or issues have been corrected or are approved by the OA to be accepted from the process.
- B. The OA will determine the date of Final Acceptance after reviewing with the CxA status of issues and required final documentation.

1.8 RELATED SECTIONS

- A. 220350 – Commissioning of Plumbing Systems and Components.
- B. 230350 – Commissioning of Mechanical System and Components.
- C. 26 02 16 - Standby Power Generation.
- D. 26 02 50 - Automatic Transfer Switch.
- E. 26 09 16 - Lighting Control System.
- F. 26 09 32 - Automatic Lighting Controls.
- G. 27 07 70 - Paging System.
- H. 27 07 71 - Classroom Sound System.
- I. 27 07 82 - Audio/Visual Systems.
- J. 28 07 21 - Fire Alarm and Detection System.

PART 2 - PRODUCTS

2.1 TEST EQUIPMENT

- A. Furnish industry standard test equipment required for performing the specified tests. Obtain proprietary vendor specific test equipment from the vendor or manufacturer, including portable or hand-held setup and calibration devices required to initialize the control.
- B. Contractor instruments shall meet the following standards:
 - 1. Be of sufficient quality and accuracy to test and/or measure system performance within the tolerances required.
 - 2. Be calibrated at the manufacturer's recommendation intervals with calibration tags permanently affixed to the instrument.
 - 3. Be maintained in good repair and operating condition throughout the duration of use on this project.
 - 4. Be immediately re-calibrated or repaired if dropped and/or damaged in any way during use on the project.

PART 3 - EXECUTION

3.1 PRE-FUNCTIONAL TESTS

- A. Construction Check Inspections: As work progresses, the Contractor shall inspect systems, subsystems, and equipment to be commissioned to verify readiness for startup, TAB, and functional performance testing. After startup is conducted, Contractor shall verify equipment is operating, and all system parameters are appropriately set prior to TAB and performance of commissioning functional tests.
- B. Startup and Initial Checkout: Once work is completed and the equipment/system is ready to operate, Contractor shall perform startup inspections/checks, and then conduct the startup procedures for systems and equipment. All pre-check and startup work shall be documented as part of the startup report.
- C. Defective Work: Report defective Work to CxA for inclusion in the Issues Log. "Defective Work" is defined in the General Conditions of the Contract for Construction.
- D. Readiness for Functional Performance Test: Contractor shall fully test and document that each system, subsystem, or equipment has been verified consistent with the stated requirements of functional performance testing and document successful completion.

3.2 DOCUMENTATION

- A. Commissioning Plan: The CxA and the OA have developed a preliminary Commissioning Plan that identifies the commissioning process and participants, consistent with the contract documents. The Contractor(s) will work with the Commissioning Team to determine how commissioning activities will be integrated into construction and trade activities. The plan shall include all members of the construction phase Commissioning Team and appropriate schedule items.

09-15/03-15

- B. Commissioning Schedule: Assist in the development of a written schedule that integrates the commissioning activities into the construction schedule specified in Division 01 Section "Construction Progress Documentation." Update commissioning schedule during the progress of construction to reflect changes in the Work. Distribute copies of updated commissioning schedule activities to members of the Commissioning Team. The commissioning schedule shall include at least the following:
1. Submittal dates for construction checklists, startup procedures, functional testing forms, O&M manuals.
 2. Schedule dates for systems and equipment startup (including services of manufacturers' authorized service representatives) and completion of construction checklists.
 3. Schedule dates for TAB procedures and testing (including each phase if project has multiple phases).
 4. Schedule dates for functional performance testing. Identify any seasonal testing required and anticipated dates.
 5. Schedule dates for training of Owner's operating personnel. Identify both "Field" training/demonstrations and "Classroom" training sessions.
 6. Dates will be determined by the OA for the (10 month) Warranty Walk by Commissioning Team
- C. Commissioning Meeting Minutes: The CxA shall prepare minutes of initial scope and progress conferences, and will include a copy of the agenda, and identify location and date of conference, and individuals in attendance. Minutes will be distributed to members of the Commissioning Team.
- D. Startup Reports: Upon completion of startup of all equipment identified to be started-up, update and complete via the Commissioning Documentation Database of the completed startup documentation and associated construction checklist. All deficiencies shall be provided in writing to the CxA for inclusion in the Issues Log.
- E. Construction Checklists & Pre-Functional Test Completion: In cooperation with manufacturers and installers, modify CxA standard checklist forms provided in other product specification sections in this project manual for use in inspecting systems, subsystems, and equipment before startup and pre-functional performance testing. Include identification of system, subsystem, or equipment, and identification of manufacturer and installer. Update and complete via the Commissioning Documentation Database.
- F. Notice of Readiness: Submitted by the Contractor to OA certifying that systems/equipment and associated controls are ready for functional performance testing.
- G. Functional Performance Test Forms: Report results of systems, subsystems, and equipment functional performance tests. Prepare reports via the Commissioning Documentation Database on approved test forms and include identification of system, subsystem, or equipment, and identify date of test, manufacturer and installer.
- H. O&M or System Data: Prepare written text and/or special drawings to provide necessary information, where manufacturer's standard printed data is not available, and information is necessary for a proper understanding and operation and maintenance of equipment or systems, or where it is necessary to provide additional information to supplement data included in the manual or contract documents. Upload this information in *.pdf format via the Commissioning Documentation Database.

3.3 FUNCTIONAL PERFORMANCE TESTING

- A. Test Procedures: Review and provide recommended edits/revisions to the Functional Test Forms provided as part of this project manual for use in conducting complete performance functional tests on systems/equipment to be commissioned. Functional Tests shall include detailed procedures for functional performance testing of systems, subsystems, and equipment.
1. Testing procedures shall verify and demonstrate the ability of systems, subsystems, and equipment to perform according to the OPR and BoD documentation and shall include the following:
 - a. Operation of each system, subsystem, and equipment through all modes of operations (seasonal, occupied, unoccupied, warm-up, cool-down, and part and full load) where there is a specified system response.
 - b. Verification of each sequence of operation.
 - c. Verification of proper responses and planned modes and conditions, including normal and abnormal operating conditions and emergency operating conditions.
 2. Develop test procedures from information provided in the following:
 - a. Approved systems descriptions.
 - b. Contract Documents.
 - c. Submittals.
 - d. Manufacturer's installation, startup, and inspection instructions.
 - e. Control operational sequences, program code, control set points, and parameters.
 - f. Each procedure shall have a unique designation.
 3. Identify test engineer to perform test and their required qualifications.
 4. The same procedure may be applied to multiple identical pieces of equipment or systems.
 5. Procedures shall reference the applicable specification Section on which the procedure is based.
 6. Identify acceptable performance.
 7. Equipment may include integral safety devices to start or prevent equipment from operation unless minimum safety standards or conditions are met. Functional performance test procedures shall demonstrate the actual performance of safety shutoffs in real or closely simulated conditions of failure. Equipment and systems that include safety devices and components that control a variety of equipment operating as a system may have interlocks hardwired or installed via software to allow functional performance test procedures to demonstrate these interlocks.
 8. Identify values for setpoints and inputs, positions of adjustable devices, valves, dampers, and switches.
 9. Identify ranges of acceptable performance for each condition tested.
 10. Write testing procedures as detailed test instructions, with sufficient step-by-step information to allow a test to be repeated under identical conditions with repeatable results.
- B. Test Methods: Verify and test performance by manipulating equipment and observing performance and responses or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by portable data loggers.
1. Verify and test performance using actual conditions whenever possible.
 2. Simulate conditions (example - impose an artificial load) as closely as possible to actual and anticipated conditions. Before simulating conditions, calibrate sensors, transducers, and devices. Set and document simulated conditions and methods of simulation. After test, return settings to normal operating conditions.

3. Alter setpoints when simulating conditions is not practical.
 4. Overwrite sensor values with a signal generator when actual or simulated conditions and altering setpoints are not practical. Do not use sensor to act as the signal generator to simulate conditions or overwrite values.
- C. Use indirect indicators for responses or performance only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings, through the control system, represent actual conditions and responses.
- D. During functional testing when issues are identified, the CxA will review the issue with the Contractor.
1. When there is an issue and the Contractor accepts responsibility to correct it:
 - a. The CxA documents the issues on the issues log and the prime contractor's response and intentions, and they go on to another test or sequence. The Prime Contractor will indicate a date that the correction will be completed. A copy is provided to the Contractor, CxA and to the Owners Representative. When the Contractor corrects the issues, signs a statement of correction, certifying that the equipment is ready to be retested, (this will be via e-mail) and sends it back to the CxA.
 - b. The Contractor reschedules the test and coordinates with CxA to establish a time and date that the test is to be repeated.
 2. If there is a dispute about an issue, regarding whether it is an issue or who is responsible:
 - a. The issues shall be documented on the issues log with the Contractor's response and a copy given to the A/E and Owner's Representative and to the Contractor Representative assumed to be responsible.
 - b. Other parties are brought into the discussions as needed to determine the compliance of the issues. Final interpretive authority is with the A/E. Final acceptance authority is with the A/E.
 - c. The CxA documents the resolution process. Once the interpretation and resolution have been decided on that issue, the appropriate party corrects the deficiency, notifies the CxA. The Contractor reschedules and coordinates with CxA to establish a time and date that the test is to be repeated. This will occur until satisfactory performance is achieved.
 3. All unresolved issues and deficiency items at substantial completion will be added to the A/E punchlist.
- E. Cost of Retesting
1. The cost for the contractor to retest during functional testing, if they are responsible for the issues, shall be theirs. Contractor acknowledges that successful completion of pre-functional testing and documentation of same as described here-in certifies that the system, subsystem, or equipment has been tested by them and is ready for functional test by the CxA Team.
 2. For issues identified, not related to any construction checklist or startup fault, the following shall apply: The CxA will direct the retesting of the equipment once at no "charge" to the Contractor for CxA time. However, the CxA's time for further retest will be charged to the Contractor. Contractor agrees to reimburse the CxA at the hourly rates included herein.
 3. The time for the CxA to direct any retesting required because a specific construction checklist, start-up test, or pre-functional test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back charged to the Contractor. Contractor agrees to reimburse the CxA at the hourly rates included herein.

4. Items of non-compliance in material, installation or setup are corrected at the Contractors'/Sub-Contractors' expense and the system retested in accordance with paragraph 3.5 of this section at the expense of the Contractor/Sub-Contractor who shall bear expenses of the CxA during retesting at \$1600 per day or partial day.

- F. Contractor agrees that the OA shall document and withhold payment and deduct from Contractor's retainage funds the necessary amounts as stated above to compensate the Commissioning Authority for retest after the second failed functional performance test.

3.4 TRAINING

- A. Schedule and coordinate training sessions for the Owner's staff or agent for each system. Training shall be in a classroom and on-site setting with the appropriate schematics, handouts, and visual/audio training aids with equipment. The appropriate installing contractors shall provide Training Schedule and Agenda as outlined in related sections.

1. The appropriate installing contractors shall provide training on all the major systems per specifications, including peculiarities specific to this project.
2. The equipment vendors shall provide training on the specifics of each major equipment item including philosophy, troubleshooting, and repair techniques.
3. The automatic control and fire alarm vendors shall provide training on the control system and fire alarm system per their specification section.

3.5 COMMISSIONING SCHEDULE

Each Contractor involved with the installation, setup or field testing of equipment/components associated with systems to be commissioned shall participate as required to achieve a complete commissioning process. Equipment/Systems designated to be commissioned and required testing documentation for this project are described in product specification sections.

END OF SECTION

SECTION 024119

SELECTIVE STRUCTURE DEMOLITION

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. Demolition and removal of selected portions of building or structure.
- 2. Demolition and removal of selected site elements.
- 3. Salvage of existing items to be reused or recycled.

- B. Related Requirements:

- 1. Section 011000 "Summary" and Section 011400 "Work Restrictions" for restrictions on the use of the premises, Owner-occupancy requirements, and phasing requirements.
- 2. Section 017300 "Execution" and Section 017329 "Cutting and Patching" for cutting and patching procedures.
- 3. Section 017419 "Construction Waste Management" for disposal of demolished material tracking and Sustainable Design (LEED) requirements for projects pursuing LEED certification.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review areas where existing construction is to remain and requires protection.

1.6 SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Use of elevator and stairs.
 - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Inventory: Submit a list of items to be removed and salvaged and deliver to Owner prior to start of demolition.
- D. Predemolition Photographs or Digital Recordings: Submit before Work begins.
- E. Warranties: Documentation indicated that existing warranties are still in effect after completion of selective demolition.
- F. Inventory: Submit a list of items that have been removed and salvaged.
- G. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.7 QUALITY ASSURANCE

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

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
 - 1. Hazardous materials will be removed by Owner before start of the Work.
 - 2. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.
- C. Sustainable Design (LEED) Requirements for Building Reuse: Refer to Section 018113.14 and comply with requirements when applicable.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
 - 1. Comply with requirements for existing services/systems interruptions specified in Section 011400 "Work Restrictions."
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange or notify Owner to arrange to shut off indicated utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
 - 1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 - 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 - 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 - 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 - 5. Maintain fire watch and portable fire-suppression devices for at least two hours after flame-cutting operations.
 - 6. Maintain adequate ventilation when using cutting torches.
 - 7. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 - 8. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.

9. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
 10. Dispose of demolished items and materials promptly. Comply with requirements in Section 017419 "Construction Waste Management and Disposal" if LEED certification is sought.
- B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
1. Comply with requirements for access and protection specified in Section 015000 "Temporary Facilities and Controls."
- C. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Pack or crate items after cleaning. Identify contents of containers.
 3. Store items in a secure area until delivery to Owner.
 4. Transport items to Owner's storage area as designated by Owner.
 5. Protect items from damage during transport and storage.
- D. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

1. Do not use methods requiring solvent-based adhesive strippers.
- F. Wall Coverings: Removal of existing wall coverings, where walls are to remain, is to be performed by individuals with experience in their removal.
1. Use appropriate techniques as not to damage the paper facing of gypsum board substrates.
- G. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Division 9 for Sections with new roofing requirements.
1. Remove existing roof membrane, flashings, copings, and roof accessories.
 2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be [recycled,] reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and recycle or dispose of them according to Section 017419 "Construction Waste Management and Disposal."
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
 4. Comply with requirements specified in Section 017419 "Construction Waste Management and Disposal."
- B. Burning: Do not burn demolished materials.

3.7 CLEANING

- A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION

SECTION 033000 - CAST-IN-PLACE 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 cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Footings.
 - 2. Foundation walls.
 - 3. Slabs-on-grade.
 - 4. Suspended slabs.
 - 5. Concrete toppings.
- B. Related Sections:
 - 1. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
 - 2. Division 32 Section "Concrete Paving" and "Decorative Concrete Paving" for concrete pavement and walks.

1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, other pozzolans, and silica fume; subject to compliance with requirements.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - 1. Location of construction joints is subject to approval of the Architect.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Steel reinforcement and accessories.
 - 4. Curing compounds.
 - 5. Floor and slab treatments.
 - 6. Bonding agents.
 - 7. Adhesives.
 - 8. Vapor retarders.
 - 9. Joint filler.
 - 10. Repair materials.
- B. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
 - 1. Aggregates.
- C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.
 - 1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.
- D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- E. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs Project personnel qualified as an ACI-certified Flatwork Technician and Finisher and a supervisor who is a certified ACI Flatwork Concrete Technician.
- B. 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 in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency shall be retained by the owner, shall be acceptable to authorities having jurisdiction, and shall be qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."

- E. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

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. General: Formwork and accessories shall conform to ACI 301, Section 2.
- 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.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber reinforced plastic, paper, or fiber tubes that produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- E. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Low-Alloy-Steel Reinforcing Bars (weldable): ASTM A 706/A 706M, deformed.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, cut true to length with ends square and free of burrs.
- B. 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," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.5 CONCRETE MATERIALS

- A. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I or Type III.
 - 2. Fly Ash: ASTM C 618, Class F or C.
 - 3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: as indicated on the drawings.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Water and Water Used to Make Ice: ASTM C 94/C 94M, potable or complying with ASTM C 1602/C 1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4.

2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260/C 260M.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will 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.

2.7 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class C, not less than 10 mils thick. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.

2.8 CURING MATERIALS

- A. General: As per ACI 301, Section 5, Article 5.2, with selections and supplements as specified herein.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable or complying with ASTM C 1602/C 1602M.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1 D, Class B, dissipating (sodium silicate type not permitted) having a fugitive dye to facilitate visual check of coverage.

2.9 RELATED MATERIALS

- A. Premolded Joint Filler: Expansion and Isolation Joint Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork. ½" thick x full depth of slab.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, aromatic polyuria with a Type A shore durometer hardness range of 90 to 95 according to ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

2.10 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150/C 150M, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.11 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. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: The use of fly ash or ground granulated blast-furnace slag to reduce the total amount of portland cement, which would otherwise be used is permitted. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash: 20 percent.
 - 2. Slag Cement: 15 percent.
 - 3. Flyash shall not be used in combination with slag cement.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing and high-range water-reducing 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.

2.12 FABRICATING REINFORCEMENT

- A. General: Reinforcement shall conform to ACI 301, Section 3.
- B. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.13 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.

PART 3 - EXECUTION

3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces exposed to view.
 - 2. Class B, 1/4 inch for rough-formed finished surfaces intended to receive plaster, stucco or wainscoting.
 - 3. Class C, 1/2 inch for permanently exposed surfaces where finishes are not specified

- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Construct forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations
- H. All exterior corners and edges of permanently exposed concrete shall be chamfered where shown on the drawings.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303 "Code of Standard Practice for Steel Buildings and Bridges."

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

- A. General: Reinforcement shall conform to ACI 301, and shall comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.

3.5 JOINTS

- A. General: Joints shall conform to ACI 301, Section 5. 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.
 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 3. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth as shown in the drawing details.
 1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks (0-2 hours after the final finish at each joint location) using the early-entry dry-cut process per ACI 302.1R. The saw shall employ the use of a skid plate to prevent spalling and raveling of the slab.
- 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.
 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 "Joint Sealants," are indicated.
 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.6 CONCRETE PLACEMENT

- A. General: As per ACI 301, Section 5, except as noted.
- B. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed, including cleaning of reinforcing steel and forms.
- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.
- D. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
 - 1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 - 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 - 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- E. Hot-Weather Placement: Comply with ACI 301 and ACI 305.1 and as follows:
 - 1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 - 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.
- F. 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. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- G. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations, so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

3.7 FINISHING FORMED SURFACES

- A. General: As per ACI 301, Section 5, Article 5.3.3.
- B. 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.
- C. 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.

3.8 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. 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 to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- C. 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 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 floor surfaces to the following tolerances, according to ASTM E 1155, for a randomly trafficked floor surface:
 - a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15; for carpeted slabs-on-grade and non-critical floors where slabs remain exposed, such as mechanical rooms.
 - b. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade with thin floor coverings.
 - c. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs. F(L) measured with shored floors only.)
 - d. Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24; for very flat floors for high-speed forklifts, air pallets, ice rink, roller rink, slabs to receive polished concrete finish.
 - e. For wood covered floors, and with other floor finishes as indicated in their technical sections and required by their manufacturers, the slab shall be steel troweled to a true level and finished smooth and straight to a tolerance of 1/8 inch to any 10-foot radius.
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated on the architectural drawings. While concrete is still plastic, slightly scarify surface with a fine broom.

1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.

E. 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.

3.9 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

B. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel finish concrete surfaces.

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 305.1 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 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 the remainder of the curing period.

D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.

E. 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 with the following materials:

a. Water.

b. Continuous water-fog spray.

c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inchlap over adjacent absorptive covers.

2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.

- a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
3. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.11 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 1. Defer joint filling until concrete has aged at least one month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joints clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.12 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
 1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations.

- Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- D. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- E. Repair materials and installation not specified above may be used, subject to Architect's approval.

3.13 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.
- B. Concrete testing shall be in accordance with ACI 301, Section 1, Article 1.6 except as noted herein.
- C. Required special inspection and verification as outlined in the applicable building code including but not limited to:
1. Steel reinforcement and placement.
 2. Embedded bolts and studs to be installed in concrete prior to concrete placement.
 3. Verification of use of required design mixture.
 4. At the time concrete is sampled for test cylinders, perform slump and air content tests and temperature of concrete.
 5. Concrete placement, including conveying and depositing.
 6. Curing procedures and maintenance of curing temperature.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172/C 172M shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture as follows:
 - a. At least once a day.
 - b. At least once for each 150 cu. yd. or fraction thereof of concrete.
 - c. At least once for each 5,000 SF or fraction thereof of surface area for slabs or walls.
 - d. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 2. All samples shall be taken after any addition of water at the job site is complete. When pumping or pneumatic equipment is used, samples shall be taken at discharge end. This is for both cylinders and slump tests.

3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
4. Air Content: ASTM C 231/C 231M, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - a. Air content tests shall be made on all concrete whether the concrete is designated as air-entrained or not.
 - b. Additional air contents tests, for concrete specified as air-entrained, shall be made when any of the following conditions occur:
 - 1) A change in appearance or consistency of concrete.
 - 2) Possible reduction of air content due to time delays of truck and/or hot weather.
 - 3) When air temperature is over 80 deg F, check each truck load.
 - c. Inform Engineer immediately of any slump and/or air content tests that do not meet these specifications. If strength, durability or aesthetics of the structure would be impaired, that concrete shall not be used.
5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
6. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure either 6" x 12" or 4" x 8" standard cylinder specimens for each composite sample as follows:
 - 1) Four cylinders, each 6 inches diameter by 12 inches tall, or
 - 2) Five cylinders, each 4 inches diameter by 8 inches tall.
7. Compressive-Strength Tests: ASTM C 39/C 39M; test one laboratory-cured specimen at 7 days (2 days for post-tensioned concrete) and one set of specimens at 28 days. Retain one specimen for possible 56 day test if required.
 - a. The 28-day compressive-strength test shall be the average compressive strength from a set of laboratory-cured specimens obtained from same composite sample and tested at age indicated.
 - b. Each set of 28-day laboratory-cured specimens shall consist of one of the following, at a minimum. Cylinder sizes shall remain consistent for each concrete mixture for the duration of the project.
 - 1) Two cylinders, each 6 inches diameter by 12 inches tall.
 - 2) Three cylinders, each 4 inches diameter by 8 inches tall.
8. Strength of each concrete mixture will be satisfactory if every average of any three consecutive 28-day compressive-strength tests equals or exceeds specified compressive strength and no 28-day compressive-strength test value falls below specified compressive strength by more than 500 psi.
9. Test results shall be reported in writing to the Structural Engineer, Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
10. Verbal information on any concrete not meeting these specifications shall be communicated to the engineer immediately by phone.

11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M by other methods as directed by Architect.
13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.

END OF SECTION 033000

SECTION 033543

POLISHED CONCRETE FINISHING

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 polished concrete finishing and scoring.
 - 1. Concrete for polished concrete, including concrete materials, mixture design, placement procedures, initial finishing, and curing is specified in Section 033000 "Cast-in-Place Concrete."
- B. Related Requirements:
 - 1. Section 034800 "Precast Concrete Specialties" for concrete not designated as polished concrete.

1.3 DEFINITIONS

- A. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of polished concrete.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with polished concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Cast-in-place concrete subcontractor.
 - e. Polished concrete finishing subcontractor.
 - 2. Review concrete mix design, cold- and hot-weather concreting procedures, curing procedures, construction joints, concrete repair procedures, concrete finishing, polished concrete finishing, application of stains, densifiers and protective finishes and protection of polished concrete.

1.5 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturers technical data, application instructions and recommendations.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Polishing Schedule: Submit plan showing polished concrete surfaces and schedule of polishing operations for each area of polished concrete before start of polishing operations. Include locations of all joints, including construction joints.
- D. Samples for Initial Selection: For each type of product requiring color selection.
- E. Samples for Verification: For each type of exposed color.
- F. Qualification Data: For Installer.
- G. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Repair materials.
 - 2. Liquid floor treatments.

1.6 QUALITY ASSURANCE

- A. Mockups: Before casting concrete, build mockup slab-on-grade to verify selections made under Sample submittals and to demonstrate typical joints, surface finish, tolerances, and standard of workmanship. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
 - 1. Build mockups in the location and of the size indicated or, if not indicated, as directed by Architect.
 - a. Size: 100 square feet.
 - b. Concrete to be same mix design as scheduled for the projects polished concrete locations.
 - c. Placement and finishing work shall be performed by the same personnel that will place and finish concrete for the project.
 - 2. Mockup to demonstrate curing, finishing, and protecting of polished concrete.
 - a. Perform grinding, honing and polishing work as scheduled for the project using the same personnel that will perform work for the project.
 - 3. Approval will be for compliance of the following:
 - a. Approved submittals.
 - b. Specified aggregate exposure class.
 - c. Specified appearance level.
 - d. Specified color.
 - 4. Maintain mock-up slab-on-grade during construction in an undisturbed condition as a standard for judging the completed Work.

5. Demolish and remove mockup when directed.

1.7 FIELD CONDITIONS

- A. Traffic Control: Maintain access for vehicular and pedestrian traffic as required for other construction activities.
- B. Damage and Stain Prevention: Do not allow, or protect from, the following:
 1. Application of liquid membrane forming curing compounds.
 2. Use of markers, spray paint, soapstone or other marking mediums.
 3. Storage of any items on concrete prior to 28 days after placement.
 4. Storage of ferrous metal items on concrete surfaces.
 5. Protect surfaces from any petroleum, oil or hydraulic fluids that can drip from equipment.
 - a. Do not allow pipe cutting activities.
 6. Protect from painting activities.

PART 2 - PRODUCTS

2.1 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.
 1. Basis of Design: Subject to compliance with requirements provide H & C Clear Liquid Hardener and Densifier by H & C Concrete Products. Available products that may be incorporated into the Work include the following:
 - a. Ardex Americas; PC 50 Lithium Densifier.
 - b. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
- B. Protective Finish: Clear, waterborne solution to be used with manufacturers liquid hardener to provide stain resistance and provide reflectivity when burnished.
 1. Basis of Design: Subject to compliance with requirements provide H & C Lithium Protective Finish by H & C Concrete Products. Available products that may be incorporated into the Work include the following:
 - a. Ardex Americas; PC Finish.
 - b. Euclid Chemical Company (The), an RPM company; Euco Ultraguard.
- C. Accessories
 1. Repair Material: A product that is designed to repair cracks and surface imperfections. The specified material must have sufficient bonding capabilities to adhere after the polishing of the concrete surface and provide abrasion resistance equal to or greater than the surrounding concrete substrate.
 2. Grout material: A thin mortar used for filing spaces. Acceptable products shall be:

- a. Epoxy, urethane, polyurea or polyaspartic resins.
- b. Latex or acrylic binders mixed with cement dust from previous grinding steps.
- c. Silicate binders mixed with cement dust from previous grinding steps.

PART 3 - EXECUTION

3.1 GENERAL

- A. Newly placed concrete shall be at least 28 days old before staining.

3.2 POLISHING

- A. Apply polished concrete finish system to cured and prepared slabs to match accepted mockup.
 1. Initial Grinding: Machine grind floor surfaces to receive polished finishes level and smooth and to depth required to reveal aggregate.
 - a. Repeat grinding, scrubbing and rinsing of floor surfaces per manufacturers recommended sequence to achieve specified level.
 - b. Class C aggregate exposure, approximately 1/8-inch surface depth cut, for medium aggregate exposure.
 2. Scoring: Score decorative jointing in concrete surfaces 1/16-inch-deep with diamond blades to match pattern indicated. Rinse until water is clear.
 - a. Joint Width: 3/8 inch.
 3. Penetrating Liquid Floor Treatment: Apply densifier floor treatment to concrete surface in polishing sequence and according to manufacturer's written instructions,
 - a. Allow recommended drying time between successive coats.
 - b. After surface is completely dry, continue polishing with progressively finer-grit diamond polishing pads per manufacturers recommended sequencing.
 4. Grout Grinding, Honing and Polishing: Grind, hone and polish concrete to achieve indicated aggregate exposure and appearance (gloss) level.
 - a. Continue grinding, honing and polishing with progressively finer-grit diamond polishing pads per manufacturers recommended sequencing.
 - b. Scrub and rinse floor surfaces per manufacturers recommendations between grinding and honing sequences.
 - c. Control and dispose of waste products produced by grinding, honing and polishing operations.
 5. Final Polishing: Perform final polishing with indicated finer-grit diamond polishing pads to appearance (gloss) level indicated to match approved mockup.
 - a. Level 3: High sheen, 800 grit, semi-polished gloss finish.
 6. Protective Finish: Apply protective finish to concrete surface according to manufacturer's written instructions. Items and procedures below include basic application information but are not inclusive of all manufacturer's instructions and requirements.

- a. Apply with microfiber pads.
- b. Apply at rate of 2,500 square foot per gallon.
- c. Apply in thin, multiple coats.
- d. Burnish/buff between coats with high-speed machine using fine/ultra-fine buffing pads.

B. CLEANING AND PROTECTION

1. Control and dispose of waste products produced by grinding and polishing operation during various stages of the process.
2. Remove splatter from adjoining surfaces as required.
3. Protect finished concrete surfaces until they are fully cured per manufacturers recommendations.

END OF SECTION

SECTION 034800

PRECAST CONCRETE SPECIALITIES

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 units including the following:
 - a. Precast interior stair treads, risers and landings.

- B. Related Requirements:

- 1. Section 055113 "Metal Pan Stairs" for steel stairs to receive and support precast concrete stair components from this section.
- 2. Section 079200 "Joint Sealants" for sealants installed with terrazzo stair components.

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.

1.5 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. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- D. 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 locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.
 5. Indicate relationship of architectural precast concrete units to adjacent materials.
 6. If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and indicate modified areas on Shop Drawings. Do not adversely affect the appearance, durability, or strength of units.
- E. 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.
1. Include Sample showing color and texture of joint treatment.
 - a. Sealant Samples for Initial Selection: Color charts consisting of actual sections of sealant showing manufacturer's full range of colors.
 - b. Grout Samples for Verification: Showing color and texture of joint treatment.
- F. 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.
- G. Qualification Statements: For installer and fabricator.
- H. Material Test Reports: For the following items:
1. For aggregates.
 2. Cementitious materials.
 3. Reinforcing materials.
 4. Admixtures.
- I. Source quality-control test reports.
- J. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Certified 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. 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 designated as an APA-certified plant for production of architectural precast concrete products.
- C. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- D. 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."

1.7 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.

1.8 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 re-handling.
- B. Support units during shipment on non-staining 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 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," 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. Treads and connection shall be capable of supporting dead loads plus a uniform live load of 100 pounds per square foot.
 - 2. Thermal Movements: Provide for in-plane thermal movements resulting from annual ambient temperature changes of 80 deg F.

2.2 PRECAST CONCRETE STAIR TREADS

- A. Precast concrete stair treads risers and landing fabricated in lengths and thickness indicated on Drawings.

1. Units are to be fully supported installation units. They will be placed on continues metal pan stair material.
2. Treads and riser to be integral one piece units minimum 2 inches thick.
3. Landing units to be minimum 2 inches thick.
4. Treads and landing nosings to each have 2 imbedded, integral non-slip abrasive bars.
 - a. Nosings to be radiused or beveled to achieve a 1 inch toe space.
5. Color / Finish: As selected by Architect from Manufacturer's full range.

B. Manufacturers: Subject to compliance provide products by one of the following:

1. Pompili Precast Concrete.
2. Sidley Precast Group, a division of RW Sidley, Inc.
3. Stepstone, Inc.
4. Wausau Tile, Inc.

2.3 ABRASIVE NOSINGS (for Precast Concrete Treads)

A. Cast-Metal Units: Cast iron or aluminum, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.

1. Basis of Design: Subject to compliance with requirements provide Wooster Products Spectra Safety Treads or comparable product by the following:
 - a. American Safety Tread Co., Inc.
 - b. Balco, Inc.
2. Model Type: Spectra Type WP-1.
3. Configuration: Abrasive filler in 3/4" wide by 3/8 inch thick extruded aluminum base.
4. Nosings to be full length of treads less 1/8 inch clearance at each end.

B. Provide anchors for embedding units in concrete, either integral or applied to units, as standard with manufacturer.

C. Apply bituminous paint to concealed surfaces of cast-metal units set into concrete.

2.4 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.

2.5 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), epoxy-coated, deformed.
- B. 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.

2.6 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 white cement, of same type, brand, and mill source.
- 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 as recommended by fabricator.
- C. 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.
 - 1. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand compatible with coarse aggregate; to match approved finish sample.
- 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 117.
- 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.
 - 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.

2.7 STAINLESS STEEL CONNECTION MATERIALS

- A. Stainless Steel Plate: ASTM A240/A240M or ASTM A666, Type 304, Type 316, or Type 201.

- B. Stainless Steel Bolts and Studs: ASTM F593, Alloy Group 1 or 2) hex-head bolts and studs; ASTM F594, Alloy Group 1 or 2 stainless steel nuts; and flat, stainless steel washers.
 - 1. Lubricate threaded parts of stainless steel bolts with an antiseize thread lubricant during assembly.

2.8 ACCESSORIES AND SETTING MATERIALS

- A. Precast Accessories: Provide clips, hangers, high-density plastic or steel shims, and other accessories required to install architectural precast concrete units.
- B. Setting Materials for Precast Concrete: Installation over steel substrates.
 - 1. Epoxy Adhesive: Two component, compatible with concrete units and substrate

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.
 - 2. Where only one face of unit is exposed use either a single design mixture or separate mixtures for face and backup.
- 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 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. 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 radiused.

2.11 FABRICATION

- A. Furnish loose hardware items including anchors, dowels, inserts and other hardware for securing architectural precast concrete units to supporting and adjacent construction.
- B. Cast-in reglets, slots, holes, and other accessories in architectural precast concrete units as indicated on the Contract Drawings.
- 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 to maintain at least 1 1/2-inch minimum concrete cover. 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.
- 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 face mixture to a minimum thickness after consolidation of the greater of 1 inch or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.
- G. Place concrete in a continuous operation to prevent cold joints or planes of weakness from forming in precast concrete units.
- H. 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.
- I. Comply with PCI MNL 117 for hot- and cold-weather concrete placement.
- J. 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.

- K. 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.
- L. 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.
- B. Fabricate architectural precast concrete units to shapes, lines, and dimensions indicated so each finished unit complies with the following product tolerances:
 - 1. Overall Height and Width of Units, Measured at the Face Exposed to View: As follows:
 - a. Plus or minus 1/8 inch.
 - 2. Overall Height and Width of Units, Measured at the Face Not Exposed to View: As follows:
 - a. Plus or minus 1/4 inch.
 - 3. Variation from Square: Plus or minus 1/4 inch/72 inches.
 - 4. Length and Width of Block-outs and Openings within One Unit: Plus or minus 1/4 inch.
 - 5. Location and Dimension of Block-outs Hidden from View and Used for Utility Penetrations: Plus or minus 3/4 inch.
 - 6. Local Smoothness: 1/4 inch/10 feet.
 - 7. Warping: 1/16 inch/12 inches of distance from nearest adjacent corner.
 - 8. Tipping and Flushness of Plates: Plus or minus 1/4 inch.
- C. Position Tolerances: For cast-in items measured from datum line location, as indicated on Shop Drawings.
 - 1. Inserts: Plus or minus 1/2 inch.
 - 2. Handling Devices: Plus or minus 3 inches.
 - 3. Reinforcing Steel and Welded Wire Reinforcement: Plus or minus 1/4 inch where position has structural implications or affects concrete cover; otherwise, plus or minus 1/2 inch.
 - 4. Position of Sleeve: Plus or minus 1/2 inch.

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 sample units and as follows:
 - 1. Honed Finish: Use continuous mechanical abrasion with fine grit, followed by filling and rubbing procedures.

- B. Finish exposed top and portion of the back surfaces exposed to view of architectural precast concrete units to match face-surface finish.
- C. Finish unexposed surfaces of architectural precast concrete units with as cast finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting stair structural frame and metal stair pan conditions for compliance with requirements for installation tolerances, bearing surface tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Place 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 positions are completed.
- B. Place architectural precast concrete units in position by setting in epoxy adhesive over steel substrates according to ANSI 108.6 or as otherwise indicated on Shop Drawings.
 - 1. Remove temporary shims, wedges, and spacers as soon as practical
- C. Install precast stair components using stainless steel connection materials as indicated by manufacturers shop drawings and Delegated Design.

3.3 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.
- C. Remove and replace damaged architectural precast concrete units when repairs do not comply with requirements.

3.4 CLEANING

- A. Clean surfaces of precast concrete units exposed to view.
- B. Clean mortar 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 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

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 Unit Masonry Assemblies.
- B. Related Sections:
 - 1. Section 072100 "Thermal Insulation" for cavity wall insulation.
 - 2. Section 072726 "Fluid-Applied Membrane Air and Water-Resistive Barriers" for fluid-applied membrane air barrier applied at cavity wall face side of CMU.
 - 3. Section 076200 "Sheet Metal Flashing and Trim" for soldering sheet metal flashing.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design Submittals (LEED): Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings: For the following:
 - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 - 2. Cast Stone Trim Units: Show sizes, profiles, and locations of each stone trim unit required.
 - 3. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.
 - 4. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

- D. Samples for Initial Selection on manufacturer's selection boards, in the form of small-scale units or as noted:
1. Face brick.
 2. Cast stone trim.
 3. Colored mortar, sample kit.
- E. Samples for Verification: For each type and color of the following:
1. Facebrick, in the form of straps of five or more bricks.
 2. Weep holes/vents.
 3. Accessories embedded in masonry.
- F. Material Certificates: For each type and size of the following certifying that each material is in compliance. Include materials test reports for masonry units:
1. Masonry units.
 - a. Include data on material properties.
 - 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.
 - e. For all masonry units, include data and calculations establishing average net-area compressive strength of units.
 2. Mortar and grout mixes, materials and admixtures.
 3. Reinforcing bars.
 4. Joint reinforcement.
 5. Anchors, ties and metal accessories.
 6. Masonry Membrane Flashing Compatibility Data: Masonry membrane flashings, fluid-applied membrane air & water resistive barriers over substrates, sealants and other related materials shall be compatible with one another under conditions of service and application, as demonstrated by masonry membrane flashing manufacturer based on testing and field experience.
- G. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
 2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- H. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.6 QUALITY ASSURANCE

- A. Mockups: Refer to Division 01 Section "Mock Ups" for requirements.

1.7 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 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. 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. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
- E. 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 and in Table 1 included below.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

TABLE I: COLD WEATHER REQUIREMENTS

Temperature Range	Procedures
40 to 32 ° F (4 to 0 ° C)	<ol style="list-style-type: none"> 1. Heat mixing water or sand to produce mortar temperatures between 40 and 120 ° F (4 and 49 ° C). 2. Cover masonry with a weather-resistant membrane for 48 hours after construction.
32 to 25 ° F (0 to -4 ° C)	<ol style="list-style-type: none"> 1. Heat mixing water and sand to produce mortar temperatures between 40 and 120 ° F (4 and 49 ° C). 2. Heat grout materials to produce grout temperatures between 40 and 120 ° F (4 and 49 ° C). 3. Maintain mortar and grout above freezing until used in masonry. 4. Cover masonry with a weather-resistant membrane for 48 hours after construction.
25 to 20 ° F (-4 to -7 ° C)	<ol style="list-style-type: none"> 1. Heat mixing water and sand to produce mortar temperatures between 40 and 120 ° F (4 and 49 ° C). 2. Heat grout materials to produce grout temperatures between 40 and 120 ° F (4 and 49 ° C). 3. Maintain mortar and grout above freezing until used in masonry. 4. Heat masonry units to 40 ° F (4 ° C) if grouting. 5. Use heat on both sides of walls under construction. 6. Cover masonry with insulating blankets or provide enclosure and heat for 48 hours after construction to prevent freezing. 7. Install wind breaks when wind velocity exceeds 15 mi./h (25 km/h).
20 ° F (-7 ° C) and Below	<ol style="list-style-type: none"> 1. Heat mixing water and sand to produce mortar temperatures between 40 and 120 ° F (4 and 49 ° C). 2. Heat grout materials to produce grout temperatures between 40 and 120 ° F (4 and 49 ° C). 3. Maintain mortar and grout above freezing until used in masonry. 4. Heat masonry units to 40 ° F (4 ° C). 5. Provide enclosures and use heat on both sides of walls under construction to maintain temperatures above 32 ° F (0 ° C) within the enclosures. 6. Provide enclosure and heat to maintain temperatures above 32 ° F (0 ° C) for 48 hours after construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- 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.

2.2 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops f_m of 2,500 psi net-area compressive strengths at 28 days.
 - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to TMS 602/ACI 530.1/ASCE 6.

2.3 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- C. Finish and Appearance:
 - 1. Interior and exterior finished concrete masonry unit's appearance shall exceed the finish requirements of ASTM C90, to require repair of chipped, cracked or broken units that have visible defects from a distance of ten (10) feet under diffused permanent lighting. Repair or replacement of masonry units is covered in Part 3 Tolerances in this section.
 - 2. Interior and exterior finished unit masonry appearance shall be required to conform to quality standards set by the approved masonry mock ups.
- D. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.4 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. For ends of sills and caps and for similar applications that would otherwise expose unfinished surfaces, provide units without cores or frogs and with exposed surfaces finished.
 - 3. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
 - 4. Provide bullnose units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C 90.
 - 1. Density Classification: Medium weight unless otherwise indicated.
 - 2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

3. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.

C. Concrete Building Brick: ASTM C 55.

1. Density Classification: Medium weight.

2.5 BRICK

A. 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.
5. Provide special shapes as indicated on drawings.

B. Clay Face Brick: Facing brick complying with ASTM C 216.

1. Basis of Design: Subject to compliance with requirements, provide facebrick by Belden Brick or comparable products by one of the following:
 - a. Glen Gary Brick Company.
2. Grade: SW.
3. Type: FBX.
4. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi.
5. Initial Rate of Absorption: Less than 30 g/30 sq. in. per minute when tested per ASTM C 67.
6. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
7. Facebrick Type 1 – Glen-Gery, Sioux City Brick, Carbon Black Velour.
 - a. Color and Texture: Dark Grey, wire cut.
 - b. Size (Actual Dimensions): 3-5/8 inches wide by 2-1/4 inches high by 11-5/8 inches long (Norman).

2.6 CAST-STONE TRIM UNITS

A. Cast-Stone Units: Comply with ASTM C 1364.

1. Units shall be manufactured using the vibrant dry tamp method.
2. Units shall be resistant to freezing and thawing as determined by laboratory testing according to ASTM C 666/C 666M, Procedure A, as modified by ASTM C 1364.

B. Manufacturers:

1. Continental Cast Stone Manufacturing, Inc.

2. Custom Cast Stone, Inc.
 3. Edwards Cast Stone Company.
 4. Rock Cast, Division of Reading Rock, Inc.
- C. Fabricate units with sharp arris and accurately reproduced details, with indicated texture on all exposed surfaces unless otherwise indicated.
1. Slope exposed horizontal surfaces 1:12 to drain unless otherwise indicated.
 2. Provide raised fillets at backs of sills and at ends indicated to be built into jambs.
 3. Provide drips on projecting elements unless otherwise indicated.
- D. Fabrication Tolerances:
1. Variation in Cross Section: Do not vary from indicated dimensions by more than 1/8 inch.
 2. Variation in Length: Do not vary from indicated dimensions by more than 1/360 of the length of unit or 1/8 inch whichever is greater, but in no case by more than 1/4 inch.
 3. Warp, Bow, and Twist: Not to exceed 1/360 of the length of unit or 1/8 inch, whichever is greater.
 4. Location of Grooves, False Joints, Holes, Anchorages, and Similar Features: Do not vary from indicated position by more than 1/8 inch on formed surfaces of units and 3/8 inch on unformed surfaces.
- E. Acid etch units after curing to remove cement film from surfaces to be exposed to view.
- F. Colors and Textures: Provide units with fine-grained texture and the following color(s):
1. Color to match Continental Cast Stone Grey color.

2.7 MORTAR AND GROUT MATERIALS

- A. Mortar Cement: ASTM C1329.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Fairborn Cement Company, MIAMI Mortar Cement.
 - b. Lafarge Holcim US.; Holcim Mortar Cement.
 - c. Lafarge Holcim US.; Lafarge Mortar Cement.
 - d. Lehigh Hanson, HeidelbergCement Group; Lehigh Mortar Cement.
 - e. Preblended mortar mix with sand:
 - 1) SPEC MIX: Mortar Cement & Sand Masonry Mortar (80 lb. bags and 3000 lb. bulk bag mix for use in silo system).
- B. Colored Cement Product: Packaged blend made from mortar cement and mortar pigments, all complying with specified requirements, and containing no other ingredients.
1. Colored Mortar Cement:
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Fairborn Cement Company, Colored MIAMI Mortar Cement.
 - 2) Lafarge Holcim US.; Holcim Mortamix Rainbow Custom Color Mortar Cement.
 - 3) Preblended mortar mix with sand:

- a) SPEC MIX; Colored Mortar Cement & Sand Masonry Mortar (80 lb. bags and 3000 lb. bulk bag mix for use in silo system).
2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
3. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
 - a. Pigments shall not exceed 5 percent of masonry cement or mortar cement by weight.
 - b. Use only colored cement products.
 - c. Color: to be selected from manufacturer's full range of colors.
- C. 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.
- D. Aggregate for Grout: ASTM C 404.
- E. Water: Potable.

2.8 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in cells at locations indicated. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
 - b. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
 - c. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.
- C. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
 1. Interior Walls: Mill 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.
- D. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.
- E. Masonry Joint Reinforcement for Multiwythe Masonry:

1. Ladder type with 1 side rod at each face shell of hollow masonry units more than 4 inches wide, plus 1 side rod at each wythe of masonry 4 inches wide or less.
2. 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 adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.

2.9 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. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
 2. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.
 3. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
 4. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
 5. Stainless-Steel Sheet: ASTM A 666, Type 304.
 6. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
 7. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.
- B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
1. Z-shaped ties with ends bent 90 degrees to provide hooks not less than 2 inches long may be used for masonry constructed from solid units.
 2. Where wythes do not align, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
 3. 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, sized to extend within 1 inch of masonry face, made from 0.187-inch-diameter, hot-dip galvanized steel wire.
- E. 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 0.05-inch-thick, steel sheet, galvanized after fabrication.
 2. Tie Section: Triangular-shaped wire tie, sized to extend within 1 inch of masonry face, made from 0.187-inch-diameter, hot-dip galvanized steel wire.
 3. Insulation Clip: Thermafiber RainBarrier Insulation Retaining Clip. Utilize at each tie to secure insulation board products snug to face of concrete surface.
- F. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist tension and compression forces perpendicular to plane of wall, for attachment over sheathing to wood or metal studs, and as follows:
 - a. Structural Performance Characteristics: Capable of withstanding a 100-lbf load in both tension and compression without deforming or developing play in excess of 0.0625 inch.
2. Screw-Attached, Masonry-Veneer Anchors: Units consisting of a wire tie and a metal barrel style screw anchor section. Provide manufacturer's standard screw type appropriate for connecting to substrate.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Heckman Building Products, Inc.; Pos-I-Tie with Thermal Wing Nut and self-drilling # 668-H135 Brick Veneer to Steel Stud Screw for use with steel stud backup.
 - 2) Heckman Building Products, Inc.; Pos-I-Tie with Thermal Wing Nut and #668-LE415 Brick Veneer to Concrete/Block Screw for use CMU or Concrete backup.
 - 3) Hohmann & Barnard, Inc.; Thermal 2-Seal Wing Nut Anchor for use with steel stud backup.
 - 4) Hohmann & Barnard, Inc.; Thermal Concrete 2-Seal Wing Nut Anchor for use with concrete and CMU backup.
 - 5) Wire-Bond; Sure Tie Anchoring System Thermal with #4520 SureTie Anchor, #4590 Thermal Grip Washer and #4510 Sure Tie Triangle for use with steel stud backup.
 - 6) Wire-Bond; Sure Tie WS Tapcon Thermal with #4532 SureTie WS Tapcon, #4590 Thermal Grip Washer and #4515 Sure Tie WS Double Hook for use with concrete and CMU backup.
 - b. Anchor Section: Corrosion-resistant, eye-screw designed to receive wire tie. Eye-screw has barrel that seats directly against framing and is same thickness as insulation plus sheathing and includes gasketed EPDM washer head that sits tight against wall sheathing.
 - c. Wire Ties: Triangular shaped wire ties fabricated from 0.187-inch-diameter, hot-dip galvanized steel wire.
 - d. Insulation Washer: Manufacturer's plastic wedge shaped for flat insulation washer pressed over the outboard end of slotted anchor and held tightly in place by wire tie.
3. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C 954 except manufactured with hex washer head and neoprene or EPDM washer, No. 10 diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours per ASTM B 117.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) ITW Buildex; Teks Maxiseal with Climaseal finish.
 - 2) Textron Inc., Textron Fastening Systems; Elco Dril-Flex with Stalgard finish.
 - 3) Hilti, Kwik-Flex.

2.10 EMBEDDED FLASHING MATERIALS

A. Masonry Metal Flashing: Provide metal flashing complying with Division 07 Section – Sheet Metal Flashing and Trim, and as follows:

1. Stainless Steel: ASTM A 240/A 240M or ASTM A 666, Type 304, thickness as indicated.
2. Masonry Metal Flashing (General Use): Fabricate from 0.030 inch (22 gauge), type 304 stainless steel unless noted otherwise. Provide custom shapes as indicated on drawings.
 - a. Options: Provide inside and outside corners.
3. Through-Wall Flashing, Counter Flashing and Inside /Outside Corners: Fabricate from .030 inches (22 gauge), type 304 stainless steel.
 - a. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Fabricate to profiles indicated.
 - b. Flashing to extend back to face of sheathing and have leg turned up minimum 4 inches.
 - c. Fabricate inside and outside corners of through wall flashing and counter flashing as single piece with welded miter and extend 6 inches in each direction.
 - d. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
 - e. Fabricate through-wall flashing with drip edge unless otherwise indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees and hemmed.
4. Preformed Drip Edges (Drip Plate): Fabricate from 0.0162 inch (26 gauge), type 304 stainless steel.
 - a. Fabricated stainless steel metal drip edges. Extend 1/8 inch out from wall, with outer edge bent down 30 degrees and hemmed.
 - 1) Hohmann and Barnard, Inc.: Standard Drip Plate DP, 3-1/2 inches wide.
5. Preformed End Dams and Inside/Outside Corners at Lintels: For use with Masonry Membrane Flashing at steel lintels and where indicated. Fabricate from 0.0162 inch (26 gauge), type 304 stainless steel.
 - a. Provide custom end dams to match profiles of end dam shapes indicated on drawings.
 - 1) Custom end dams shall have soldered or welded seams.
 - 2) Custom end dam shall be fabricated 12 inches in length, minimum.
 - b. Provide minimum size of 3-inch x 3-inch x 3-inch at head flashing conditions.
 - 1) Hohmann and Barnard: Stainless Steel Corners and End Dams can be used where they meet specified size and requirements.
 - c. Fabricate larger sizes as required for conditions and as detailed.
 - d. Solder all metal flashing seams at corners.

B. Masonry Membrane Flashing

1. Elastomeric Thermoplastic Flashing: Composite flashing product consisting of a 0.040-inch polyester-reinforced ethylene interpolymer alloy.

- a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Hohmann & Barnard, Inc.; Flex-Flash.
 - 2) Hyload: Flashing Membrane.
 - 3) Dupont: Thru-wall Flashing.
- b. Accessories:
 - 1) Primer: Recommended by manufacturer.
 - a) Utilize supplemental spray adhesive recommended by manufacturer when additional adhesion is required.
 - 2) Sealants: Approved by flashing manufacturer and compatible with Fluid-Applied Membrane Barrier manufacturer.
- C. Base-Wall Flashing: Composite flashing product consisting of a pliable, adhesive rubberized-asphalt compound, bonded to a high-density, cross-laminated polyethylene film to produce an overall thickness of not less than 0.040 inch.
 1. Subject to compliance with requirements, provide one of the following:
 - a. Henry Company; Blueskin TWF.
 - b. Carlisle Coatings & Waterproofing; CCW-705-TWF.
 - c. W. R. Meadows, Inc.; Air-Shield Thru-Wall Flashing.
 - d. Tremco Incorporated, an RPM Company; ExoAir 110.
 - e. Grace Construction Products; Perm-A-Barrier.
 2. Accessories: Provide materials produced by flashing manufacturer.
 3. Coordination with fluid applied air barrier: Utilize material from manufacturer of selected fluid applied air barrier to ensure compatibility.
- D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."
- E. 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.
- F. Termination Bars for Masonry Flashing: Type 304 stainless steel sheet 1/8 inch-thick by 1-1/8 inch by 8-foot-long with 1/4 inch holes spaced at 8 inches on center.
 1. Hohmann & Barnard, Inc.; T1- Termination Bar.

2.11 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.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 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, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Weep/Vent Products:
 - 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 less than depth of outer wythe, in color selected from manufacturer's standard. Products:
 - a. Advanced Building Products, Inc.; Mortar Maze weep vent.
 - b. Heckmann Building Products, Inc.; No. 85 Cell Vent.
 - c. Hohmann & Barnard, Inc.; Quadro-Vent.
 - d. Wire-Bond; Cell Vent.
 - e. Sandel; Cell Vent.
 - 2. Round Plastic Weep: Medium-density polyethylene, 3/8 inch OD by 4 inches long with brass mesh screen and cotton wick.
 - a. Use only where indicated, where cellular weep/vent cannot to be used.
 - b. Product: Hohmann & Barnard, Inc. #341, W/S.
- E. Cavity Drainage Material: 2-inch thick x 10 inch high, nonabsorbent mesh, made from polymer strands, shaped to maintain drainage at weep holes without being clogged by mortar droppings. Provide 1-1/2 inch or 1 inch thick x 10 inch high mesh to fill cavity space when it is less than 2 inches. Subject to compliance with requirements, provide products by one of the following manufacturers:
 - 1. Mortar Net USA, Ltd.
 - 2. Advanced Building Products, Inc.: Mortar Break DT.
 - 3. Keene Building Products: Keenstone Cut.
- F. Backer Rod: ASTM C-1330, Type C, closed cell polyethylene round rod to close cavity at jamb conditions.

2.12 STRUCTURAL INSULATING BLOCK

- A. High density, high load cellular glass insulating block.
 - 1. Owens Corning: FoamGlas, Perinsul SIB Structural Insulating Brick.
 - a. Nominal 18-inch long, 4-inch wide, 4-inch high.

2.13 RIGID INSULATION

- A. This insulation is for use in the portion of cavity wall construction that is below the through wall flashing.
- B. Extruded-Polystyrene (XPS) Board Insulation: ASTM C 578, Type X, closed-cell product extruded with an integral skin.
 - 1. Manufacturer/Product:
 - a. Dow: STYROFOAM™ Brand CAVITYMATE™ Exterior Wall Insulation

- b. Owens Corning: FOAMULAR® CW15
 - c. DiversiFoam Products: CertiFoam 15
2. Size: 48 inch by 96 inch, utilize 16 inch by 96 inch with C.M.U. backup.
 3. Thickness/R Value: 3 inch/R Value 15.

2.14 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, provide products by one of the following:
 - a. Diedrich Technologies, Inc.
 - b. EaCo Chem, Inc.
 - c. ProSoCo, Inc.

2.15 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 mortar cement mortar only. Masonry cement is not permitted.
 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.
- 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 exterior masonry above grade and below grade or in contact with earth, use Type S.
 2. For reinforced masonry, use Type S.
 3. For mortar parge coats, use Type S.
 4. For interior applications where another type is not indicated, use 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 table 1.15.1 in 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 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2500 psi. Utilize coarse grout.
 3. Provide grout with a slump of 10 to 11 inches as measured according to ASTM C 143/C 143M.

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 SURFACE PREPARATION RELATED TO AIR BARRIER

- A. Project will have fluid-applied Membrane Air Barrier material applied to the cavity side of the CMU. Special attention and care must be taken to provide a smooth, filled surface to receive the membrane. The care is necessary to insure the design performance of the selected materials. Concrete masonry unit (CMU) wall shall be prepared as follows to accept the air and vapor barrier:
 - 1. Surfaces shall be free of contaminants such as grease, oil and wax on surfaces to receive membrane.
 - 2. The CMU surfaces shall be free from projections.
 - 3. Strike all mortar joints flush to the face of the concrete block.
 - 4. Fill all voids and holes greater than ¼ inch across at any point with mortar, sealant or other approved fill material.
 - 5. Surface irregularities exceeding ¼ inch in height or sharp to touch shall be ground flush or made smooth.
 - 6. Fill around all penetrations with mortar, sealant or other approved fill material and strike flush.
 - 7. If the surfaces cannot be made smooth to the satisfaction of the Architect, it will be the responsibility of the trade to alternatively apply a parge coat (typically one-part cement to three parts sand) over the entire surface to receive air and vapor barrier membrane.
 - 8. Remove mortar droppings on brick ties, shelf angles, brick shelves or other horizontal obstructions.
- B. Fill cracks, gaps and joints exceeding ¼ inch width with fill compound or paintable sealant.
- C. Fill rough gaps around pipe, conduit and similar penetrations with mortar, non-shrink grout, fill compound or polyurethane foam sealant shaved flush.

3.3 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. per minute when tested per ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.4 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 exposed 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. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch from one masonry unit to the next.
 4. 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.
- D. Concrete Masonry Unit work exposed at the building's interior and exterior will be required to meet standards that exceed ASTM C90, Item 7 Finish and Appearance parts 7.2 and 7.2.1.
1. Chips or cracks of any size that are visible from a distance of 10-feet, under any exterior daylighting condition and under diffused permanent lighting interior conditions will require patching with mortar. Repair must be done as that they blend in with the surface of the masonry unit.
 2. Repairs to colored decorative CMU must be done with matching colored mortar.
 3. Decorative CMU that cannot be patched so that chips or cracks are not visible, under conditions described above, will need to be replaced.
 4. At CMU that is to be painted, repairs are to be made prior to finish paint preparations being applied.
 5. All horizontal and vertical mortar joints are to be neatly struck and free of fins protruding from them.

3.5 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 CMU Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Bond Pattern for Facebrick: Unless otherwise indicated, lay exposed masonry in one-third running bond; do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- E. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. Cover work at the end of each shift. 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.
- F. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- 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 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 clearance between end of anchor rod and end of tube. Space anchors 48 inches o.c. unless otherwise indicated.
 - 3. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems."
 - 4. At non-rated partitions indicated to be sealed tight, provide compressible filler, mineral wool, mortar and/or sealant to seal all penetrations, voids or joints to resist the passage of smoke.
- J. Slope mortar fill towards exterior at base flashing locations indicated to facilitate drainage of water from cavity.

3.6 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick and CMUs as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- 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. When included in project, set cast-stone trim units in full bed of mortar with full vertical joints. Fill dowel, anchor, and similar holes.
 - 1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
 - 2. Wet joint surfaces thoroughly before applying mortar.
- D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- E. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
 - 1. Provide flush struck joints at walls to receive waterproofing and fluid applied air barrier.
- F. Dissimilar Materials: Provide continuous bond breaker material (building paper) at horizontal joints between brick and dissimilar materials. Rake mortar joints to a depth of 3/8 inch and provide sealant.

3.7 COMPOSITE MASONRY

- A. Bond wythes of composite masonry together using one of the following methods:
 - 1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.

- a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
 - b. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement.
2. Header Bonding: Provide masonry unit headers extending not less than 3 inches into each wythe. Space headers not over 8 inches clear horizontally and 16 inches clear vertically.
- B. Bond wythes of composite masonry together using bonding system indicated on Drawings.
- C. Collar Joints: Solidly fill collar joints by parging face of first wythe that is laid and shoving units of other wythe into place.
- D. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.
1. Provide continuity with masonry joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.
- E. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
1. Provide continuity with masonry joint reinforcement by using prefabricated T-shaped or L-shaped units.

3.8 CAVITY WALLS

- A. Bond wythes of cavity walls together using one of the following methods:
1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable (two-piece) type reinforcement to allow for differential movement regardless of whether bed joints align.
 2. Masonry Veneer Anchors: Comply with requirements for anchoring masonry veneers.
- B. Bond wythes of cavity walls together using bonding system indicated on Drawings.
- C. 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.
- D. Sequence and coordinate work with the installation of the air and water resistive barrier.
- E. Installing Cavity-Wall Insulation (Continuous Insulation per ASHRAE 90.1.): Apply continuous across all structural members without thermal bridges other than fasteners and service openings. Install in a manner consistent with an accepted NFPA 285 assembly. Where required, 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.
1. Confirm complete installation of air barrier prior to installation of insulation.
 2. Cut slots to fit tight around any penetrations and attach over sheathing and air and water resistive barrier membrane with screw attached masonry anchors.

3. Provide continuous bead of sealant at entire perimeter of insulation board.
4. Fill cracks and open gaps in insulation board with compatible crack sealer.
5. Install masonry-veneer anchor with plastic insulation washer to provide tight fit to hold insulation tight to sheathing.
6. Cavity wall insulation is not intended to be exposed for extended periods of time (i.e.: in excess of 60 days) without adequate protection. Protect exposed insulation per manufacturer's instructions.
7. Cut top of insulation to slope towards exterior at flashing locations indicated.
8. At CMU backup, install insulation so masonry joint reinforcement occurs at insulation seams and utilizes rain barrier clip. Maximum spacing at 16 inches o.c.

3.9 ANCHORING MASONRY VENEERS

- A. Anchor masonry veneers to wall framing with masonry-veneer anchors to comply with the following requirements:
1. Fasten screw-attached anchors through sheathing to wall framing with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
 2. Size and install anchor screw fastener with appropriate length for slotted wing nut and insulation washer. Install insulation slotted wing nut and washer to have tight friction fit to insulation boards and hold them tightly against the sheathing. If manufacturer's insulation washer is a 'flat' type, provide multiple washers as required for a tight installation.
 3. Confirm solid anchorage to metal wall framing. If solid anchorage does not occur, remove anchor and seal hole with sealant compatible with the fluid applied membrane air barrier system.
 4. Embed tie sections in masonry joints. Provide not less than 2-1/4 inches of air space between back of masonry veneer and face of sheathing/insulation.
 5. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
 6. Space anchors as indicated, but not more than 16 inches o.c. vertically and 16 inches o.c. horizontally with not less than 1 anchor for each 1.75 sq. ft. of wall area. Install additional anchors within 12 inches of openings and at intervals, not exceeding 16 inches, around perimeter. Do not install anchors through flashing materials.

3.10 STRUCTURAL INSULATING BLOCK

- A. Verify structural steel surface is free of dirt, scale, grease, mill oils, water, ice or any other materials that would inhibit bond between steel and structural insulating block.
- B. Apply construction adhesive to facer surface of structural insulating block. Use a fine notched trowel to spread adhesive fully over surface of structural insulating block. Ensure edge-to-edge coverage.
- C. Place adhesive facer down on clean structural steel surface. Move block back and forth to ensure fully mated surface and ensure adhesive exposure along full perimeter.
- D. Wait 24-hours before loading structural insulating block with masonry construction.
- E. Weather protect installed structural insulating block.

3.11 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - a. Where 12-inch-high units are utilized, space reinforcement not more than 24 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls and parapet walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches 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, unless indicated otherwise.
- D. Provide continuity at corners by using prefabricated L-shaped units.

3.12 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 o.c. vertically and 36 inches o.c. horizontally.

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 as follows:
 - 1. Install preformed control-joint gaskets designed to fit standard sash block.
 - 2. Where exposed to view, 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. Form open joint full depth of brick wythe and of width indicated, but not less than 3/8 inch for installation of compressible filler, sealant and backer rod specified in Division 07 Section "Joint Sealants."

- D. Provide horizontal, pressure-relieving joints by inserting a compressible filler of width required for installing sealant and backer rod specified in Division 07 Section "Joint Sealants," but not less than 3/8 inch minimum.
 - 1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.14 LINTELS

- A. Install steel lintels where indicated.
- B. Provide steel lintels where shown and where openings of more than 12 inches for brick-size units and 24 inches for block-size units are shown without structural steel or other supporting lintels.
- C. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.
 - 1. Provide continuous bond breaker material at all bearing locations.

3.15 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, where parapets abut vertical walls, other obstructions to downward flow of water in wall, and where indicated. Install vents at shelf angles, ledges, and other obstructions to promote upward flow of air in cavities, and where indicated.
 - 1. Flashing: Utilize manufacturers recommended primer for proper adhesion.
- 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, adhere flashing to masonry unit or metal flashing and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. At base of multiwyth and veneer masonry walls, install Base-Wall Flashing as shown on the Drawings.
 - a. Continuous composite flashing product is to be installed as to connect the foundation waterproofing system to the back-up wall's air barrier system. This flashing occurs below where through wall flashing extends out to face of wall.
 - b. Use manufacturer's adhesive products for additional adhesion.
 - c. Install continuous termination bar fastened at 8 inches o.c. with a continuous bead of sealant along the top.
 - d. Flash over Base-Wall Flashing as detailed.
 - 3. At base of multiwyth masonry walls, including cavity walls and extend Masonry Metal Flashing through outer wythe, across air space and up face of inner wythe minimum of 8 inches.
 - a. Lap joints between metal flashing 4 inches with a continuous bead of sealant. Provide a loose lock expansion joint at every third joint or at maximum 30 feet.
 - b. Lap metal flashing with metal corner pieces with a continuous bead of sealant.
 - c. Corner pieces are to have soldered joints.
 - d. Continuously flash over Masonry Metal Flashing with thermoplastic Masonry Membrane Flashing. Extend up inner wythe surface as shown.

- e. Use manufacturer's adhesive products for additional adhesion.
 - f. Install continuous termination bar fastened at 8" on center with continuous sealant at top.
4. At base of masonry-veneer walls, extend Metal Flashing through veneer, across air space and up face of sheathing minimum 8 inches.
 - a. Lap joints between metal flashing 4 inches with a continuous bead of sealant. Provide a loose lock expansion joint at every third joint or at maximum 30 feet.
 - b. Lap metal flashing with metal corner pieces with a continuous bead of sealant.
 - c. Corner pieces are to have soldered joints.
 - d. Continuously flash over Masonry Metal Flashing with thermoplastic Masonry Membrane Flashing. Extend up inner wythe surface as shown.
 - e. Use manufacturer's adhesive products for additional adhesion.
 - f. Install continuous termination bar fastened at 8" on center with a continuous bead of sealant along the top.
5. At lintels and head conditions, extend thermoplastic Masonry Flashing through veneer, over lintel and across air space and up face of sheathing minimum 8 inches.
 - a. Use manufacturer's adhesive products for additional adhesion.
 - b. Provide sloped back in cavity to provide positive drainage. Refer to drawings.
 - c. Install continuous termination bar fastened at 8" on center with continuous sealant at top.
 - d. Extend flashing a minimum of 8 inches, unless indicated otherwise, into masonry at each end and install preformed end dams.
 - e. Provide sealant at termination of flashing at end dams.
 - f. Provide additional flashing at ends of flashing to close off ends and prohibit moisture from getting behind flashing and weather barriers where required.
6. Preformed Metal Flashing Products: Install Metal Flashing drip edges beneath Masonry Flashing at exterior face of wall where indicated. Stop thermoplastic Masonry Flashing ½ inch back from outside face of wall and adhere flashing to top of metal drip edge. Provide continuous sealant at edge of flashing and tool sealant so to not inhibit water flow to the exterior. Drip should occur at face of wall. Flat surface should not extend out past face of wall.
 - a. Utilize preformed inside and outside corners.
 - b. Lap Metal Flashing drip edges 3 inches at ends in full bed of sealant. Provide sealant at edge of overlap.
 - c. At lap, notch metal flashing 3 inches at the hemmed drip edge to provide interlocking flush joint with adjacent drip.
7. Extend Masonry Flashing 1/4 inch from face of wall where Metal Flashing drip edges are not utilized.
8. Lap continuous Masonry Flashing a minimum of 8 inches. Coat the contacting surfaces with manufacturer's recommended supplemental adhesive or sealant. Apply continuous sealant at edges of all laps. Utilize rollers to ensure full adhesion of flashing to substrate.
9. Provide additional masonry flashing at inside and outside corners to lap ends of adjacent flashing terminations.
10. End Dams: Provide end dams at the following locations.
 - a. At all terminations of flashings unless noted otherwise. Provide additional length of flashing to fold and form into end dam.
 - b. At openings at base of walls such as doors.

- c. At all inside and outside corners.
- 11. Provide continuous sealant at underside of metal drip edges and under flashing where lintel extends into bed joint at jamb conditions.
- 12. Through – Wall and Counter Flashing: Where through – wall flashing is indicated, Metal Flashing or Masonry Flashing, lap adjacent pieces a minimum of 3 inches in full bed of sealant. Trim flashing so lap is not present on face of wall and receiver. Seal edges of flashing.
 - a. Where Metal Flashing is shown with reglet receiver, install counter flashing in receiver with stainless steel fasteners at 16 inches o.c. and seal fasteners. Stagger counter flashing minimum of 8 inches from through wall flashing splice joint
 - b. Inside and outside corners: Overlap through wall flashing in full bed of sealant and miter / trim flashing as required to provide water tight installation. Install additional masonry flashing at corners extending 8 inches in each direction.
- C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.
- D. Install weep/vents in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:
 - 1. Space weep holes 24 inches o.c. unless otherwise indicated.
- E. Place cavity drainage material at base of wall in cavities and where flashing and weeps are indicated.
- F. Where shown for cavity ventilation, install weep/vents in head joints in exterior wythes at 24 inches on center within 12 inches from top of wall.
- G. Where grade varies, and flashing is stepped, provide minimum of 12 inches horizontal overlap with flashing between lower and upper flashing. Provide prefabricated end dams at ends.

3.16 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 other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
 - 1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 - 2. Limit height of vertical grout pours to not more than 60 inches.

3.17 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.
1. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.

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 nonmasonry 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 masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.
 6. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.
 7. Clean cast stone trim to comply with stone supplier's written instructions.

3.19 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.

END OF SECTION

SECTION 051200 - STRUCTURAL STEEL FRAMING

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. Structural steel.
2. Field-installed shear connectors.
3. Grout for baseplates and bearing plates.

- B. Related Sections:

1. Division 03 Section "Cast-in-Place Concrete" for setting anchor rods and embedded plates in concrete.
2. Division 05 Section "Architecturally Exposed Structural Steel Framing" for additional requirements for architecturally exposed structural steel.
3. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
4. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications and other metal items not defined as structural steel.
5. Division 05 Section "Metal Stairs."
6. Division 07 Section Sprayed-on fireproofing.
7. Division 09 painting Sections for surface-preparation, priming requirements and touch up painting.

1.3 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

1.4 COORDINATION

- 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 anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions and directions for installation.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 PERFORMANCE REQUIREMENTS

- A. The drawings indicate typical connection details, specific connection details and/or connection details indicating design intent for the various connection locations required by the drawings. Simple connections may not be detailed on the drawings. The steel fabricator shall provide details of all connections including the connections not specifically detailed, following the intent of the drawings. The connection design shall be performed under the supervision of a qualified professional engineer registered in the state where the project is located. The connections shall be designed for loads shown on the drawings. Where the reactions of beams and girders are not shown, the connections shall be designed to support the maximum allowable uniform loads as indicated in the load tables of the AISC Steel Construction Manual for the given beam size and span. Double angle and single plate connections detailed in accordance with the AISC Steel Construction Manual are acceptable; single angle connections are not permitted.
1. Select and complete connections using schematic details indicated and AISC 360.

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings:
1. Provide shop drawings including erection drawings and detail sheets of all structural steel components.
 - a. Erection drawings shall include at a minimum:
 - 1) Anchor rod plans and embedment plans showing templates and directions for installation of anchor rods and other anchorages and embedded items to be installed by others.
 - 2) Floor and roof plans.
 - 3) Mezzanines, entrances, canopies and trellis.
 - 4) Plans shall include member marks and all dimensions and elevations required to erect the structural steel.
 - 5) Details and/or sections of all erections that include field welding, assembly, processes, field alignment, etc.
 - b. For fabrication and detail drawings:
 - 1) Include sizes, dimensions, steel grade, surface preparation, primer paint, details of cuts, copes, connections, splices, camber, holes, and other pertinent data.
 - 2) Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
 - 3) Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
 - 4) Identify members and connections of the seismic-load-resisting system.
 - 5) Indicate locations and dimensions of protected zones.
 - 6) Identify demand critical welds.
 2. The electronic files of the project's structural drawings will be provided upon request for use in the preparation of fabrication or erection drawings.
 - a. Prior to receiving the drawing files, the contractor is required to sign an "Agreement for Transfer and Use of Electronic Files."

- b. The electronic files are not contract documents. Significant differences may exist between the electronic files and the corresponding hard copy documents due to addenda, change orders, revisions, layer visibility or other reasons. In the event of a conflict, printed hard copy drawings and specifications shall take precedence over electronic files. The Contractor is responsible to verify the accuracy of all data contained in the electronic files.
 - c. If the electronic files are imported into other software or applications packages for the purpose of preparing fabrication, erection, manufacturing drawings or any other type of document, the contractor shall verify all dimensions, lines, reference points, etc. with annotated dimensions found elsewhere in the contract documents. The Contractor is responsible to adjust the file accordingly prior to their use of the files.
- C. Delegated-Design Submittal: Calculations stamped and signed by an engineer registered in the state where project is located for:
- 1. Moment connections (flexible, partially restrained and fully restrained).
 - 2. Bracing connection (x-brace, v-brace, etc.)
 - 3. As noted on drawings.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, fabricator and shop-painting applicators.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties, to comply with ASTM A6 or ASTM A568.
- E. Product Test Reports: For the following:
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength bolt-nut-washer assemblies.
 - 4. Shear stud connectors.
 - 5. Shop primers.
 - 6. Nonshrink grout.
- F. Survey of existing conditions.
- G. Source quality-control reports.
- H. Field quality-control and special inspection reports.

1.9 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.

B. Comply with applicable provisions of the following specifications and documents:

1. AISC 303.
2. AISC 341 and AISC 341s1.
3. AISC 360.
4. RCSC's "Specification for Structural Joints Using High-Strength Bolts."

1.10 DELIVERY, STORAGE, AND HANDLING

A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.

1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating F1852 fasteners and for retesting fasteners after lubrication.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles, M, S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M or as noted on drawings.
- D. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade C, structural tubing.
- E. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM F 3125, Grade A 325 or F 1852, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
- B. Bolts, nuts and washers indicated to be galvanized on drawings shall be hot dipped galvanized per ASTM A153.
- 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. Unheaded Anchor Rods: provide ASTM F 1554, Grade 36 unless noted otherwise on drawings.

1. Configuration: Straight.
2. Nuts: ASTM A 563 heavy-hex carbon steel.
3. Plate Washers: ASTM A 36 carbon steel.
4. Washers: ASTM F 436 Type 1, hardened carbon steel.
5. Finish: Plain, except if noted on drawings to be galvanized, provide anchor rods, plates, nuts and washers hot dipped galvanized per ASTM A153, class C.

E. Threaded Rods: ASTM A 36.

1. Nuts: ASTM A 563 heavy-hex carbon steel.
2. Washers: ASTM F 436, Type 1, hardened carbon steel.
3. Finish: Plain, except if noted on drawings to be galvanized, provide threaded rods, nuts and washers hot dipped galvanized per ASTM A153, class C.

2.3 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat. Color as indicted
- B. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

2.4 GROUT

- A. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.5 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 AISC 360.
 1. Camber structural-steel members where indicated.
 2. Fabricate beams with rolling camber up.
 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
 4. Mark and match-mark materials for field assembly.
 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according to SSPC-SP 3, "Power Tool Cleaning."
- F. 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.

- G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
 - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
 - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
 - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
- H. Equipment Supports and Mechanical Opening Framing: Framing shown on structural drawings is for general arrangement only and may require modification to suit the actual purchased equipment. Coordinate with mechanical trades for necessary certified drawings before starting fabrication. Steel Fabricator shall provide a complete job ready for installation of equipment, and Contract price shall cover this requirement regardless of subsequent modifications to framing shown on drawings, at no extra cost to the Owner.

2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened, pre-tensioned or slip critical as indicated on the drawings. Twist-off type tension-control bolts are permitted only at joints indicated as pre-tensioned or slip critical.
- B. Weld Connections: Comply with AWS D1.1/D1.1M (Structural welding code) and AWS D1.8/D1.8M (Structural welding code, Seismic Supplement) for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

2.7 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.
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be high-strength bolted with slip-critical connections.
 - 4. Galvanized surfaces.
- 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. All interior steel exposed to view SSPC – SP6 commercial blast cleaned.
 - 2. All exterior steel exposed to weather SSPC – SP10/NACE No. 2 near white blast cleaned.
 - 3. All other steel SSPC – SP3 power tool cleaned.
 - 4. SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning" for architecturally exposed steel, unless otherwise indicated in Division 05 Section "Architecturally Exposed Structural Steel Framing."
- 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. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.

2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel indicated on drawings according to ASTM A 123/A 123M.
 - 1. Fill vent and drain holes that will be exposed in the finished Work unless they will function as weep holes, by plugging with zinc solder and filing off smooth.

2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage a special inspector to perform shop tests and inspections and prepare test reports.
 - 1. Provide special inspector and testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate do not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections shall be inspected according to RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- D. Welded Connections: all shop welded connections shall be visually inspected according to AWS D1.1/D1.1M.
- E. In addition to visual inspection, complete penetration shop-welded connections shall be tested and inspected according to AWS D1.1/D1.1M by ultrasonic inspection procedures per ASTM E164.
- F. In addition to visual inspection, shop-welded shear connectors shall be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
 - 1. Bend tests shall be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
- G. Required special inspection and verification as outlined in the applicable building code, including but not limited to:
 - 1. Material verification of high strength bolts, nuts and washers.
 - 2. Inspection of high strength bolting.
 - 3. Material verification of steel.
 - 4. Review of welders' certification.
 - 5. Material verification of weld filler material.
 - 6. Inspection of welding.
 - 7. Inspection of joint details.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
 - 1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base, Bearing 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."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
 - 1. Level and plumb individual members of structure.
 - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.
- H. 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.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.

1. Snug tight joints (bearing bolts) shall be tightened such that all plies are brought into firm contact only. This is attained with a few impacts of an impact wrench or the full effort of an ironworker using an ordinary spud wrench. Do not over-tighten bearing bolts. Do not use twist-off type tension-control bolts for bearing bolts.
 2. Pretensioned and Slip-critical bolts shall be tightened in accordance with AISC by the turn of the nut method, by using direct tension indicators, by properly calibrated wrenches or by using twist-off type tension-control bolts.
- B. Weld Connections: Comply with AWS D1.1/D1.1M (Structural welding code) and AWS D1.8/D1.8M (Structural welding code, Seismic Supplement) 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 where indicated, back gouge, and grind steel smooth.
 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a special inspector to perform tests and inspections and prepare the necessary reports.
- B. Required special inspection and verification as outlined in the applicable building code, including but not limited to:
1. Material verification of high strength bolts, nuts and washers.
 2. Inspection of high strength bolting.
 3. Material verification of steel.
 4. Review of welders' certification.
 5. Material verification of weld filler material.
 6. Inspection of welding.
 7. Inspection of joint details.
- C. Bolted Connections: Bolted connections shall be tested and inspected according to RCSC's "Specification for Structural Joints Using High-Strength Bolts." Non-slip-critical connections require only visual inspection. Pre-tensioned and slip-critical connections require inspection to conform with AISC specifications for the method of tightening selected. Contractor shall discuss with the Engineer prior to erection.
- D. Welded Connections: All field welds shall be visually inspected according to AWS D1.1/D1.1M.
1. In addition to visual inspection, full penetration field welds shall be tested and inspected according to AWS D1.1/D1.1M by ultrasonic inspection procedures, per ASTM E164.
- E. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- F. Correct deficiencies in Work that test reports and inspections indicate do not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.
- C. Touchup Painting: Cleaning and touchup painting are specified in Division 09 painting Sections.

END OF SECTION 051200

SECTION 053100 - STEEL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Roof deck.
2. Composite floor deck.
3. Noncomposite form deck.

- B. Related Sections include the following:

1. Division 03 Section "Cast-in-Place Concrete" for concrete fill.
2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
3. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
4. Division 09 painting Sections for repair painting of primed deck.

1.3 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. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, attachments to other construction, and layout of headed stud shear connectors.
 1. Shop drawings shall indicate the date of the structural drawings that were used to prepare the shop drawings.
 2. Shop drawing submittals shall consist of three (3) prints of each drawing.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of steel deck, signed by product manufacturer.
- B. Welding certificates.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
 - 1. Power-actuated mechanical fasteners.
 - 2. Acoustical roof deck.
- D. Research/Evaluation Reports: Evaluation reports from ICC-ES for each of the following:
 - 1. Steel deck.
 - 2. Power-actuated mechanical fasteners.
- E. Field quality-control test and inspection reports.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency 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."
- C. Insurance Certification: Assist Owner in preparation and submittal of roof installation acceptance certification as may be necessary in connection with fire and extended coverage insurance.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store products in accordance with SDI MOC3. 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 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Steel Deck:
 - a. ASC Profiles, Inc.
 - b. Canam Steel Corp.; The Canam Manac Group.
 - c. Consolidated Systems, Inc.
 - d. Epic Metals Corporation.
 - e. New Millennium Building Systems, LLC.
 - f. Nucor Corp.; Vulcraft Division.

- g. United Steel Deck, Inc.
- h. Valley Joist; Division of EBSCO Industries, Inc.
- i. Verco Manufacturing Co.
- j. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with the latest edition of SDI-RD "Standard for Steel Roof Deck", and with the following:
 - 1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Gray.
 - 2. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G60 zinc coating.
 - 3. Deck Profile: Type WR, wide rib as indicated on the drawings.
 - 4. Profile Depth: As indicated on the drawings.
 - 5. Design Uncoated-Steel Thickness: As indicated on the drawings.
 - 6. Span Condition: Triple span or more.
 - 7. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.3 ACOUSTICAL ROOF DECK

- A. Acoustical Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with the latest edition of SDI-RD "Standard for Steel Roof Deck", and with the following:
 - 1. Prime-Painted Steel Sheet: ASTM A 1008/A1008M, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Gray.
 - 2. Galvanized-Steel Sheet: ASTM A 653/A653M, Structural Steel (SS), Grade 33, G60 zinc coating.
 - 3. Galvanized and Shop-Primed Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33, G60 zinc coating; cleaned, pretreated and primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Gray.
 - 4. Deck Profile: Type WR, wide rib.
 - 5. Profile Depth: As indicated on the drawings.
 - 6. Design Uncoated-Steel Thickness: As indicated on the drawings.
 - 7. Span Condition: Triple span or more.
 - 8. Side Laps: Overlapped or interlocking seam at Contractor's option.
 - 9. Acoustical Perforations: Deck units with manufacturer's standard perforated vertical webs.
 - 10. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber.
 - a. Provide sound-absorbing insulation to appropriate contractor for installation into topsides of deck prior to installation of roofing materials to prevent damage of insulation by weather.

11. Acoustical Performance: NRC 0.7 for 3" profile depth, tested according to ASTM C 423.

2.4 COMPOSITE FLOOR DECK

- A. Composite Steel Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with the latest edition of SDI-C "Standard for Composite Steel Floor Deck - Slabs", with the minimum section properties indicated, and with the following:
 1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 40, G60 (Z180) zinc coating.
 2. Galvanized and shop primed steel sheet: ASTM A 653/A 653M structural steel (SS) Grade 40, G60 (Z180), zinc coating; with unpainted top surface and cleaned and pretreated bottom surface primed with manufacturer's standard baked on, rust inhibitive primer.
 3. Profile Depth: As indicated on the drawings.
 4. Design Uncoated-Steel Thickness: As indicated on the drawings.
 5. Span Condition: Triple span or more.

2.5 NONCOMPOSITE FORM DECK

- A. Noncomposite Steel Form Deck: Fabricate ribbed-steel sheet noncomposite form-deck panels to comply with the latest edition of SDI-NC "Standard for Non-composite Steel Floor Deck", with the minimum section properties indicated, and with the following:
 1. Uncoated Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 50 minimum for profile depth of 1-1/2 inches or greater and Grade 60 minimum for profile depth less than 1-1/2 inches.
 2. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 50 minimum for profile depth of 1-1/2 inches or greater and Grade 60 minimum for profile depth less than 1-1/2 inches, with top and underside surface shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Gray.
 3. Galvanized steel sheet: ASTM A 653/A 653M Structural Steel (SS) Grade 50 minimum for profile depth of 1-1/2 inches or greater and Grade 60 minimum for profile depth less than 1-1/2 inches, G60 (Z180) zinc coating.
 4. Profile Depth: As indicated on the drawings.
 5. Design Uncoated-Steel Thickness: As indicated on the drawings.
 6. Span Condition: As indicated on the drawings.
 7. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.6 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 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, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile as required to comply with SDI-C and SDI-NC for overhang and slab depth.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598-inch-thick, with factory-punched hole of 3/8-inch minimum diameter.
- I. Recessed Sump Pans: Single-piece steel sheet, 0.0747-inch-thick, of same material and finish as deck, with 3-inch-wide flanges and level recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- J. Flat Sump Plate: Single-piece steel sheet, 0.0747-inch-thick, of same material and finish as deck. For drains, cut holes in the field.
- K. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.
- L. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI-RD, SDI-C, or SDI-NC, manufacturer's written instructions, and requirements in this Section.
- B. Coordinate and cooperate with structural steel erector in locating decking bundles to prevent overloading of structural members.
- C. Do not use deck units for storage or working platforms until permanently secured.
- D. 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.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Fastening Deck:
 - 1. Fasten deck units to steel supporting members by welding as noted on drawings.

2. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work. Use welding washers where indicated on drawings.
 3. Mechanically fasten side laps of adjacent deck units as noted on drawings.
- G. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- H. Provide additional reinforcement and closure pieces at openings as required for strength and continuity of deck.
- I. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- J. Mechanical fasteners may be used in lieu of welding to fasten deck, subject to prior approval by engineer. Mechanical fastener design values shall equal or exceed the specified weld values.
1. Design Requirements: ICC-ES AC43 or SDI method for diaphragm shear strength and stiffness.
 2. Installers shall be trained and certified by manufacturer.

3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
1. Weld Diameter: As indicated on the drawings.
 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated on the drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, as indicated on the drawings:
1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
1. End Joints: Lapped 2 inches minimum.
- D. 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 weld.
- E. 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. Mechanically fasten cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

- G. No light gage framing, mechanical, electrical, or other equipment shall be suspended from or attached to any metal roof deck.

3.4 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 - 1. Weld Diameter: As indicated on the drawings.
 - 2. Weld Spacing: Space and locate welds as indicated.
 - 3. Weld Washers: Floor deck less than 0.028 inches (22 ga.). Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Butted.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- F. Ceilings, ductwork and lights may be hung from the composite floor deck after concrete has reached 75% of its design strength. Contractor shall list allowable hanger tab capacity on shop drawings. Hung loads shall not exceed tab capacity.
- G. Stud Shear Connectors: Weld shear connectors to supports through decking units in accordance with AWS D1.1 and manufacturer's instructions.
 - 1. Do not weld shear connectors through two layers (lapped ends) of decking units.
 - 2. Weld only on clean, dry surfaces.

3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.
- B. Required special inspection and verification as outlined in the applicable building code, including but not limited to:
 - 1. Material verification of weld filler material.
 - 2. Inspection of welding.
 - 3. Inspection of mechanical fastening.
- C. Field welds will be subject to inspection, conforming to AWS D1.3.
- D. Testing agency will report inspection results promptly and in writing to Contractor and Architect.

- E. Remove and replace work that does not comply with specified requirements.
- F. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 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.
 - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Exterior non-load-bearing wall framing.
 - 2. Interior non-load-bearing wall framing exceeding span limitations of standard, non-structural metal framing.
 - 3. Ceiling joist framing.
 - 4. Soffit Framing.
- B. Related Sections include the following:
 - 1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
 - 2. Division 09 Section "Non-Structural Metal Framing" for standard, interior non-load-bearing, metal-stud framing, with span limitations, and ceiling-suspension assemblies.
 - 3. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies, with span limitations.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at project site.

1.4 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer as defined in section 014000 "Quality Requirements", to design cold-formed steel framing.
- B. Structural Performance: The delegated designer shall design a complete system incorporating the minimum member sizes and the details indicated on the drawings. The complete system shall conform to the design intent indicated on the drawings. This system shall include all framing members shown on the structural drawings. Any deviation from this design shall be reviewed by the Architect and Engineer, and additional review costs shall be the responsibility of the Contractor. The supplier and delegated designer are responsible to provide and design all connections, bracing, bridging, stiffeners, etc. as well as miscellaneous structural elements not already sized on the contract documents required for a complete system and continuous load path as indicated on the structural drawings. The design shall not impose loading on the structure which differs from the design intent indicated on the drawings. Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
 - 1. Design Loads: As indicated on the drawings.
 - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:

- a. Exterior Wall Framing: Horizontal deflection shall not exceed the following for the respective supported finishes:

EIFS	1/240
Brick Veneer	1/600
Brick Veneer Wainscot Less Than 1/3 Story Height of Stud	1/360
Cultured Stone	1/600
Terra Cotta*	1/360
Metal Panel*	1/240
Interior Finished Drywall	1/360

Back span deflection shall not be reduced by high loads on parapets.

*Verify deflection criteria with finish system manufacturer's recommendations. Design with consideration for differential deflection between adjacent members as recommended by manufacturer.

- b. Interior Wall Framing: Horizontal deflection of 1/240 of the wall height under a horizontal load of 5 lbf/sq. ft.
- c. Floor Joist Framing: Vertical deflection of 1/480 for live loads and 1/360 for total loads of the span.
- d. Roof Rafter Framing: Vertical deflection of 1/360 for live load of the horizontally projected span and 1/240 of the horizontally projected span for total load.
- e. Ceiling Joist Framing: Vertical deflection of 1/360 of the span for total load.
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.
4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
- a. Upward and downward movement of 1inch, unless indicated otherwise on drawings.
5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Standards: Framing shall comply with AISI S100, AISI S200, and the following:
1. Floor and Roof Systems: AISI S210.
 2. Wall Studs: AISI S211
 3. Headers: AISI S212.
 4. Lateral Design: AISI S213.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed metal framing product and accessory indicated.

- B. 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, splices, accessories, connection details, and attachment to adjoining work.
- C. Delegated-Design Submittal: For cold-formed metal framing indicated to comply with design loads, include shop drawings and structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation, registered in the state where the project is located.

1.6 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of code-compliance certification for studs and tracks.
- C. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Powder-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.
- D. Evaluation Reports: For nonstandard cold-formed steel framing, post-installed anchors, and powder-actuated fasteners, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.7 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. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.
- D. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- E. Code-Compliance Certification of Studs and Tracks: Provide documentation that framing members are certified according to the product-certification program of the Certified Steel Stud Association, the Steel Framing Industry Association, the Steel Stud Manufacturers Association, or a similar organization that provides verifiable code compliance program.

- F. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3/D1.3M, "Structural Welding Code--Sheet Steel."
- G. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling as required in AISI's "Code of Standard Practice".
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AllSteel Products, Inc.
 - 2. California Expanded Metal Products Company.
 - 3. Clark Dietrich Building Systems.
 - 4. Consolidated Fabricators Corp.; Building Products Division.
 - 5. Craco Metals Manufacturing, LLC.
 - 6. Custom Stud, Inc.
 - 7. Formetal Co. Inc. (The).
 - 8. MarinoWare; a division of Ware Industries.
 - 9. Quail Run Building Materials, Inc.
 - 10. SCAFCO Corporation.
 - 11. Steel Construction Systems.
 - 12. Steeler, Inc.
 - 13. United Metal Products, Inc.
 - 14. Telling Industries, LLC.

2.2 MATERIALS

- A. Framing Members, General: Comply with ASTM C955.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: ST33H, ST50H.
 - 2. Coating:
 - a. G90 or GF90 for wall back up at brick veneer.
 - b. G60, A60, AZ50, or GF30 for all other framing.
- C. Steel Sheet for Connection Clips and Connection Materials: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:

1. Grade: 50, Class 1 or 2.
2. Coating: G90.

2.3 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: As indicated on the drawings (0.0428 inch for wall stud back up at brick veneer).
 2. Minimum Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: Matching steel studs.
 2. Minimum Flange Width: 1-1/4 inches.
- C. Vertical Deflection Clips: Manufacturer's standard clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Clark Dietrich Building Systems.
 - b. MarinoWare, a division of Ware Industries.
 - c. SCAFCO Corporation
 - d. The Steel Network, Inc.
- D. 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 and transfer them to the primary structure.
- E. Slotted Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; punched with vertical slots in both legs. Studs should be positively attached to deep-leg track using vertical slots while allowing free vertical movement. Legs designed to support horizontal and lateral loads and transfer them to the primary structure.

2.4 CEILING JOIST FRAMING

- A. Steel Rafters: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: As indicated on the drawings.
 2. Minimum Flange Width: 1-5/8 inches, minimum.

2.5 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:

1. Minimum Base-Metal Thickness: As required by design. Coordinate with finish system manufacturer's recommendations.
2. Minimum Flange Width: 1-5/8 inches, minimum.

2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A1003, Structural Grade, Type H, G90.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Web stiffeners.
 4. Anchor clips.
 5. End clips.
 6. Foundation clips.
 7. Gusset plates.
 8. Stud kickers, knee braces, and girts.
 9. Joist hangers and end closures.
 10. Hole reinforcing plates.
 11. Backer plates.

2.7 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.
- B. Anchor Bolts: ASTM F 1554, Grade 36, threaded carbon-steel headless, hooked bolts and carbon-steel nuts; and flat, hardened-steel washers; zinc coated by hot-dip process according to ASTM A 153, Class C.
- C. 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 Acceptance Criteria as appropriate for the substrate.
- D. Power-Actuated Fasteners: Fastener systems 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 AC70.
- E. 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.
- F. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035.
- B. Cement Grout: Portland cement, ASTM C 150/C 150M, 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: Factory-packaged, nonmetallic, noncorrosive, nonstaining grout, complying with ASTM C 1107/C 1107M, and with a fluid consistency and 30-minute working time.
- D. Shims: Load-bearing, high-density, multimonomer, nonleaching plastic; or cold-formed steel of same grade and metallic coating as framing members supported by shims.
- E. Sealer Gaskets: Closed-cell neoprene foam, 1/4-inch-thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.

2.9 FABRICATION

- A. Fabricate cold-formed steel framing 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 framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - 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, with screws penetrating joined members by no fewer than three exposed screw threads.
 - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies by means that prevent damage or permanent distortion.
- C. Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable 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 from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, conditions, and abutting structural framing 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. 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 framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- C. Install load-bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch to ensure a uniform bearing surface on supporting concrete or masonry construction.
- D. 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.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing according to ASTM C1007 and AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
 - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
 - 1. Cut framing members by sawing or shearing; do not torch cut.
 - 2. Fasten cold-formed metal framing members by welding or screw fastening as indicated on the drawings. Wire tying of framing members is not permitted. Welding of studs at brick veneer back up is not permitted.
 - a. Comply with AWS D1.3 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, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. 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.
- G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.

- H. Install insulation, specified in Division 07 Section "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.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

3.4 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 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-leg deflection tracks and anchor to building structure.
 - 2. Connect vertical deflection clips to studs and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically 48 inches maximum or as indicated on Shop Drawings. Fasten at each stud intersection.
 - 1. Channel Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 2. Strap Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
 - 3. Bar Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Top Bridging for Single Deflection Track: Install row of horizontal bridging within [**12 inches** of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - 1. Install solid blocking at 96-inch centers or as indicated on Shop Drawings.
- G. 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 wall-framing system.

3.5 JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
 - 1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
 - 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.
- C. Space joists not more than 2 inches from abutting walls, and as follows:
 - 1. Joist Spacing: As indicated on the drawings.
- D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.
- E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated.
 - 1. Install web stiffeners to transfer axial loads of walls above.
- F. Install bridging at intervals indicated. Fasten bridging at each joist intersection as follows:
 - 1. Joist-Track Solid Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
 - 2. Combination Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.6 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a special inspector to perform field tests and inspections and prepare test reports.
- B. Field and shop welds will be subject to testing and inspecting conforming to AWS D1.3 requirements.
- C. Required special inspections and verifications as outlined in the applicable building code, including but not limited to:
 - 1. Fabrication and welding of fabricated cold formed metal elements.
- D. Testing agency will report test results promptly and in writing to Contractor and Architect.
- E. Remove and replace work where test results indicate that it does not comply with specified requirements.

- F. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 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 framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

SECTION 055000

METAL FABRICATIONS

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 may or may not include the following, and is not limited to the items listed:

1. Steel framing and supports for operable partitions.
2. Steel framing and supports for overhead doors.
3. Steel framing and supports for countertops.
4. Steel framing and supports for laboratory equipment.
5. Steel framing and supports for mechanical and electrical equipment.
6. Steel framing and supports for applications where framing and supports are not specified in other Sections.
7. Elevator machine beams, hoist beams.
8. Steel shapes for supporting elevator door sills.
9. Slotted channel framing.
10. Shelf angles.
11. Metal ladders.
12. Miscellaneous steel trim including steel angle corner guards, steel edgings and loading-dock edge angles.
13. Metal bollards.
14. Loose bearing and leveling plates for applications where they are not specified in other Sections.
15. Decorative aluminum louver panels.

- B. Products furnished, but not installed, under this Section:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

1.3 COORDINATION

- 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 and steel weld plates and angles for casting into concrete. 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.

1.4 SUBMITTALS

- A. Product Data: For the following:
 - 1. Shop primers.
 - 2. Shrinkage-resisting grout.
 - 3. Slotted channel framing.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings: Show fabrication and installation details for metal fabrications. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
 - 1. Steel framing and supports for operable partitions.
 - 2. Steel framing and supports for mechanical and electrical equipment.
 - 3. Steel framing and supports for applications where framing and supports are not specified in other Sections.
 - 4. Shelf angles.
 - 5. Metal ladders.
 - 6. Metal bollards.
- D. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Welding certificates.
- F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel."
- B. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1, "Structural Welding Code - Steel."

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls, floor slabs, decks and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.3 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- C. Steel Pipe: ASTM A 53, standard weight (Schedule 40) unless otherwise indicated.
- D. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4.
 - 1. Size of Channels: 1-5/8 by 1-5/8 inches or as indicated.
 - 2. Material: Galvanized steel complying with ASTM A 653, commercial steel, Type B, with G90 (Z275) coating; 0.079-inch nominal thickness.
 - a. Basis of Design: Subject to compliance with requirements. Provide support system by Hilti Corporation, Strut HS 1-5/8" 14 gauge Pre Galvanized channels and accessories or comparable products by:
 - 1) Unistrut
 - 2) Kindorf.
- E. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.

2.4 NONFERROUS METALS

- A. Aluminum Plate and Sheet: ASTM B 209, Alloy 6061-T6.
- B. Aluminum Extrusions: ASTM B 221, Alloy 6063-T6.

2.5 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.
 - 1. Provide stainless-steel fasteners for fastening aluminum or stainless steel.
- B. Steel Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, nuts and, where indicated, flat washers; ASTM F 593 (ASTM F 738 M) for bolts and ASTM F 594 (ASTM F 836 M) for nuts, Alloy Group 1 (A1).
 - 1. Threaded Rods and Adhesive Anchoring System (Epoxy Anchors).
 - a. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 - 1) Hilti Corporation HAS Threaded Rods 304 Stainless Steel and HIT RE 500 Adhesive Epoxy System for use in concrete and solid or grouted masonry.
 - 2) Hilti Corporation HAS Threaded Rods 304 Stainless Steel and HIT HY 20 Adhesive Epoxy System with screen tubes for use in hollow and multi-width masonry.
- D. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Hot-dip galvanize or provide mechanically deposited, zinc coating where item being fastened is indicated to be galvanized.
- E. Eyebolts: ASTM A 489.
- F. Machine Screws: ASME B18.6.3.
- G. Lag Screws: ASME B18.2.1.
- H. Wood Screws: Flat head, ASME B18.6.1.
- I. Plain Washers: Round, ASME B18.22.1.
- J. Lock Washers: Helical, spring type, ASME B18.21.1.
- K. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- L. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- M. Post-Installed Anchors: Torque-controlled expansion anchors.

1. Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
 2. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941, Class Fe/Zn 5, unless otherwise indicated.
 3. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.
- N. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches by length indicated with anchor straps or studs not less than 3 inches long at not more than 8 inches o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting", Section 099123 "Interior Painting."
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Shrinkage-Resistant Grout: Factory-packaged, nonmetallic, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- F. Concrete for Bollards: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.7 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 2. Obtain fusion without undercut or overlap.
 3. Remove welding flux immediately.
 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- J. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches, with a minimum 6-inch embedment and 2-inch hook, not less than 8 inches from ends and corners of units and 24 inches o.c., unless otherwise indicated.

2.8 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
1. Fabricate units from slotted channel framing where indicated.
 2. Furnish inserts for units installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Galvanize miscellaneous framing and supports where indicated.
- E. Prime miscellaneous framing and supports with primers that comply with Section 099113 "Exterior Painting" or Section 099123 "Interior Painting." where indicated.

2.9 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.

1. Provide mitered and welded units at corners.
 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.
- D. Prime shelf angles located in exterior walls with primers that comply with Section 099113 "Exterior Painting".
- E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.10 METAL LADDERS

A. General:

1. Comply with ANSI A14.3 unless otherwise indicated.
2. For elevator pit ladders, comply with ASME A17.1.

B. Steel Ladders:

1. Space siderails 16 inches apart unless otherwise indicated.
2. Space siderails of elevator pit ladders 12 inches apart.
3. Siderails: Continuous, ¼ inch-by-3-inch steel flat bars, with eased edges.
4. Rungs: ¾-inch-steel bars.
5. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
6. Provide nonslip surfaces on top of each rung by coating with abrasive material metallicity bonded to rung.
7. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
8. Prime interior ladders, including brackets and fasteners, with primers that comply with Section 099123 "Interior Painting."

2.11 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C. Galvanize and prime exterior miscellaneous steel trim.
- D. Prime interior miscellaneous steel trim with primers that comply with Section 099123 "Interior Painting."

2.12 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 80 steel pipe.
 - 1. Cap bollards with 1/4-inch thick, steel plate with flat top.
- B. Fabricate bollards with 3/8-inch thick, steel baseplates for bolting to concrete slab. Drill baseplates at all four corners for 3/4-inch anchor bolts.
 - 1. Where bollards are to be anchored to sloping concrete slabs, angle baseplates for plumb alignment of bollards.
- C. Fabricate sleeves for bollard anchorage from steel stainless steel pipe or tubing with 1/4-inch- thick stainless steel plate welded to bottom of sleeve. Make sleeves not less than 8 inches deep and 3/4 inch larger than OD of bollard.
- D. Prime steel bollards with primers that comply with Section 099113 "Exterior Painting" or Section 099123 "Interior Painting."

2.13 LOOSE BEARING AND LEVELING PLATES

- A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.
- B. Galvanize bearing and leveling plates.
- C. Prime plates with primers that comply with Section 099113 "Exterior Painting".

2.14 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches unless otherwise indicated.
- C. Galvanize loose steel lintels located in exterior walls.
- D. Prime loose steel lintels located in exterior walls with primers that comply with Section 099113 "Exterior Painting".

2.15 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

2.16 DECORATIVE ALUMINUM LOUVER PANELS

- A. Decorative Aluminum Louver Panel: Infill panels made from aluminum extrusions for rooftop equipment screens.
 - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Shadow 100 Design fixed louver panels by Amteco Manufacturing Corporation.
- B. Louvers: Extruded aluminum panels, for 100 percent direct visual screening.
 - 1. Framing bars – Extruded aluminum flat bars.
- C. Fasteners: Manufacturer's standard, corrosion-resistant, color-coated fasteners matching louver components welding louvers to framing bars.
- D. Fabrication: Assemble panels by welding bars to aluminum framing.
- E. Finish exposed welds to comply with NOMMA Guideline 1, Finish #2 - completely sanded joint, some undercutting and pinholes okay.
- F. Finish: Shop Painted Polyester powder coating.

2.17 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.18 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153 for steel and iron hardware and with ASTM A 123 for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
 - 1. Shop prime with primers specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" or with primers that are compatible with specified topcoats.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Primers specified in Section 099123 "Interior Painting" SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Other Items: SSPC-SP 3, "Power Tool Cleaning."

- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the following:
 - 1. Cast Aluminum: Heavy coat of bituminous paint.
 - 2. Extruded Aluminum: Two coats of clear lacquer.

3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on Shop Drawings.

3.3 INSTALLING METAL BOLLARDS

- A. Fill metal-capped bollards solidly with concrete and allow concrete to cure seven days before installing.

1. Do not fill removable bollards with concrete.
- B. Anchor bollards to existing construction with expansion anchors. Provide four 3/4-inch bolts at each bollard unless otherwise indicated.
 1. Embed anchor bolts at least 4 inches in concrete.
- C. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete or in formed or core-drilled holes not less than 8 inches deep and 3/4 inch larger than OD of bollard. Fill annular space around bollard solidly with nonshrink, nonmetallic grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.
- D. Anchor bollards in place with concrete footings. Center and align bollards in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.

3.4 INSTALLING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.
 1. Use nonshrink, nonmetallic grout in both concealed locations where not exposed to moisture; and in exposed locations.
 2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.5 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop priming and shop painting (when applicable) 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 dry film thickness.
 - a. Apply primer and shop paint (when applicable) specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 055113

METAL PAN STAIRS

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. Preassembled steel stairs with concrete-filled treads.
2. Preassembled steel stairs with precast concrete treads, risers and landings.
3. Steel tube railings and guards attached to metal stairs.
4. Steel tube handrails attached to walls adjacent to metal stairs.

B. Related Requirements:

1. Section 034800 "Precast Concrete Specialties" for precast concrete stair treads, risers and landings installed at monumental metal pan stairs, "Stair C".
2. Section 052300 "Decorative Metal Railings" for decorative railings installed at monumental stairs, "Stair C".

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal stairs and railings and guards.
 1. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, blocking for attachment of wall-mounted handrails, and items with integral anchors, that are to be embedded in concrete or masonry.
 2. Deliver such items to Project site in time for installation.
- C. Coordinate locations of hanger rods and struts with other work so they do not encroach on required stair width and are within fire-resistance-rated stair enclosure.
- D. Schedule installation of railings so wall attachments are made only to completed walls.
 1. Do not support railings and guards temporarily by any means that do not satisfy structural performance requirements.

1.4 SUBMITTALS

- A. Product Data: For metal pan stairs and the following:
 - 1. Shop primer products.
 - 2. Abrasive nosings.
 - 3. Handrail wall brackets.
 - 4. Grout.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings:
 - 1. Include plans, elevations, sections, details, and attachments to other work.
 - 2. Indicate sizes of metal sections, thickness of metals, profiles, holes, and field joints.
 - 3. Include plan at each level.
 - 4. Indicate locations of anchors, weld plates, and blocking for attachment of wall-mounted handrails.
 - 5. Indicate locations, profile and dimensions of precast concrete treads and stair components.
- D. Delegated-Design Submittal: For stairs, railings and guards, precast concrete, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the State of Ohio.
- F. Welding certificates.
- G. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. 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."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification.
 - 1. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers.
 - 2. Protect steel members and packaged materials from corrosion and deterioration.
 - 3. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures.
 - a. Repair or replace damaged materials or structures as directed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design stairs, and railings, including attachment to building construction.
- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
 - 1. Uniform Load: 100 lbf/sq. ft.
 - 2. Concentrated Load: 300 lbf applied on an area of 4 sq. in.
 - 3. Uniform and concentrated loads need not be assumed to act concurrently.
 - 4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
 - 5. Limit deflection of treads, platforms, and framing members to $L/360$ or 1/4 inch, whichever is less.
- C. Structural Performance of Railings: 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. applied in any direction.
 - b. Concentrated load of 200 lbf 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 applied horizontally on an area of 1 sq. ft.
 - b. Infill load and other loads need not be assumed to act concurrently.
 - 3. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- D. Seismic Performance of Stairs: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
 - 1. Component Importance Factor: See structural drawings.

2.2 METALS

- A. Metal Surfaces: 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 A36/A36M.
- C. Steel Tubing for Railings: ASTM A500/A500M (cold formed) or ASTM A513/A513M.

1. Provide galvanized finish for exterior installations and where indicated.
- D. Steel Pipe for Railings: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
- E. Uncoated, Cold-Rolled Steel Sheet: ASTM A1008/A1008M, either commercial steel, Type B, or structural steel, Grade 25, unless another grade is required by design loads; exposed.
- F. Uncoated, Hot-Rolled Steel Sheet: ASTM A1011/A1011M, either commercial steel, Type B, or structural steel, Grade 30, unless another grade is required by design loads.
- G. Galvanized-Steel Sheet: ASTM A653/A653M, G90 coating, either commercial steel, Type B, or structural steel, Grade 33, unless another grade is required by design loads.
- H. Aluminum Extrusions: ASTM B221, Alloy 6063-T6.
- I. Cast Iron: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

2.3 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls.
 1. Select fasteners for type, grade, and class required.
- 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. Bolts and Nuts: Regular hexagon-head bolts, ASTM A307, Grade A; with hex nuts, ASTM A563; and, where indicated, flat washers.
- D. Anchor Bolts: ASTM F1554, Grade 36, of dimensions indicated; with nuts, ASTM A563; and, where indicated, flat washers.
 1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for exterior stairs, stairs indicated to be galvanized and stairs indicated to be shop primed with zinc-rich primer.
- E. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B633 or ASTM F1941/F1941M, Class Fe/Zn 5, unless otherwise indicated.
 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

2.4 MISCELLANEOUS MATERIALS

- A. Handrail Wall Brackets: Stamped steel, unfinished or galvanized to match handrail, from face of wall.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Blum, Julius & Co., Inc.
 - b. The Wagner Companies, R&B Wagner, Inc.
- B. Welding Electrodes: Comply with AWS requirements.
- C. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- E. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout; recommended by manufacturer for interior and exterior use; noncorrosive and nonstaining; mixed with water to consistency suitable for application and a 30-minute working time.

2.5 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. Assemble stairs and railings in shop to greatest extent possible.
 - 1. Disassemble units only as necessary for shipping and handling limitations.
 - 2. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately.
 - 1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
 - 2. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.

4. Weld exposed corners and seams continuously unless otherwise indicated.
5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 - Completely sanded joint with some undercutting and pinholes okay.

G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible.

1. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated.
2. Locate joints where least conspicuous.
3. Fabricate joints that will be exposed to weather in a manner to exclude water.
4. Provide weep holes where water may accumulate internally.

2.6 FABRICATION OF STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with NAAMM AMP 510, "Metal Stairs Manual," for Commercial Class, unless more stringent requirements are indicated.

1. Monumental Stairs are to comply with NAAMM AMP 510, "Metal Stairs Manual," for Architectural Class.

B. Stair Framing:

1. Fabricate stringers of steel rectangular tubes.
 - a. Stringer Size: As required to comply with "Performance Requirements" Article.
 - b. Provide closures for exposed ends of channel and rectangular tube stringers.
 - c. Finish: Shop primed at interior locations unless galvanized is indicated.
 - 1) Provide galvanized finish for exterior installations and where indicated.
 - 2) Shop prime galvanized framing that is to be painted.
2. Construct platforms of steel channel or rectangular tube headers and miscellaneous framing members as required to comply with "Performance Requirements" Article.
 - a. Provide closures for exposed ends of channel and rectangular tube framing.
 - b. Finish: Shop primed at interior locations unless galvanized is indicated.
 - 1) Provide galvanized finish for exterior installations and where indicated.
 - 2) Shop prime galvanized framing that is to be painted.
3. Weld stringers to headers; weld framing members to stringers and headers.
4. Where stairs are enclosed by gypsum board or shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below.
 - a. 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. Fabricate treads and landing subplatforms of exterior stairs so finished walking surfaces slope to drain.
2. Steel Sheet: Uncoated, cold-rolled steel sheet.
3. Steel Sheet: Galvanized-steel sheet, where indicated.
4. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
5. Attach risers and subtreads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
6. At concrete filled treads, shape metal pans to include nosing integral with riser.
7. At treads and risers where precast concrete is to be installed, metal pans to have required profile to provide continuous surface for precast units to be laid in full bed of setting material.
8. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.
 - a. Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

2.7 FABRICATION OF STAIR RAILINGS AND GUARDS

- A. Comply with applicable requirements in Section 055213 "Pipe and Tube Railings."
- B. Comply with applicable requirements in Section 057300 "Decorative Metal Railings" for railings and guards at Stair C, monumental stairs.
- C. Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of member, post spacings, wall bracket spacing, and anchorage, but not less than that needed to withstand indicated loads.
 1. Rails and Posts: 1-5/8-inch- diameter top and bottom rails and posts.
 2. Picket Infill: 1/2-inch- square pickets spaced less than 4 inches clear.
- D. Welded Connections: Fabricate railings with welded connections.
 1. Fabricate connections that are exposed to weather in a manner that excludes water.
 - a. Provide weep holes where water may accumulate internally.
 2. Cope components at connections to provide close fit, or use fittings designed for this purpose.
 3. Weld all around at connections, including at fittings.
 4. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 5. Obtain fusion without undercut or overlap.
 6. Remove flux immediately.
 7. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #2 - Completely sanded joint, some undercutting and pinholes are okay as shown in NAAMM AMP 521.
- E. Form changes in direction of railings as follows:
 1. By bending or by inserting prefabricated elbow fittings.
- F. 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.

- G. Close exposed ends of railing members with prefabricated end fittings.
- H. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.
 - 1. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.
- I. Connect posts to stair framing by direct welding unless otherwise indicated.
- J. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.
 - 1. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
 - 2. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
 - 3. For nongalvanized railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
 - 4. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.
- K. 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.
 - 1. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.8 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 EXAMINATION

- A. Verify elevations of floors, bearing surfaces and locations of bearing plates, and other embedments for compliance with requirements.
 - 1. For wall-mounted railings, verify locations of concealed reinforcement within gypsum board and plaster assemblies.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLING METAL PAN STAIRS

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction.
 - 1. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
 - 1. Grouted Baseplates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates.
 - a. Clean bottom surface of plates.
 - b. Set plates for structural members on wedges, shims, or setting nuts.
 - c. Tighten anchor bolts after supported members have been positioned and plumbed.
 - d. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - e. Promptly pack grout solidly between bearing surfaces and plates so no voids remain.
 - 1) Neatly finish exposed surfaces; protect grout and allow to cure.
 - 2) Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints.
 - 1. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations.
 - 2. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
 - 3. Comply with requirements for welding in "Fabrication, General" Article.
- F. Place and finish concrete fill for treads and platforms to comply with Section 033000 "Cast-in-Place Concrete."
- G. Install precast concrete treads according to manufacturer's written instructions and shop drawings.

3.3 INSTALLING RAILINGS

- A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints with tight, hairline joints.
 - 1. Space posts at spacing indicated or, if not indicated, as required by design loads.
 - 2. Plumb posts in each direction, within a tolerance of 1/16 inch in 3 feet.
 - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of stairs for sloping members do not exceed 1/4 inch in 12 feet .

4. Secure posts and rail ends to building construction as follows:
 - a. Anchor posts to steel by welding to steel supporting members.
 - b. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with post-installed anchors and bolts.

B. Attach handrails to wall with wall brackets.

1. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
2. Secure wall brackets to building construction as required to comply with performance requirements and as follows:
 - a. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
 - b. For hollow masonry anchorage, use toggle bolts.
 - c. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
 - d. For steel-framed partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
 - e. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

3.4 REPAIR

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099123 "Interior Painting."

END OF SECTION

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 (exterior use).
- 2. Stainless-steel pipe and tube railings (exterior use).

- B. Related Requirements:

- 1. Section 055113 "Metal Pan Stairs" for steel tube railings associated with metal pan stairs.
- 2. Section 057300 "Decorative Metal Railings" for stainless steel decorative railings fabricated from pipes and tubes.

1.3 COORDINATION

- 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.

1.4 SUBMITTALS

- A. Product Data: For the following:

- 1. Post-installed anchors.
- 2. Handrail brackets.
- 3. Grout, anchoring cement, and paint products.

- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Welding certificates.
- F. Qualification Data: For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the State of Ohio.
- G. Welding certificates.
- H. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.

1.5 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 D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Steel Pipe and Tube Railings:
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. Hollaender Manufacturing Company.
 - b. Wagner, R & B, Inc.
- B. Stainless-Steel Pipe and Tube Railings:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. AGS Stainless Inc.
 - b. C.R. Laurence Co. Inc.
 - c. Morse Industries.
 - d. R & B Wagner, Inc.
 - e. VIVA Railings, LLC.
- C. Source Limitations: Obtain each type of railing 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 railings, including attachment to building construction.
- 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. applied in any direction.
 - b. Concentrated load of 200 lbf 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 applied horizontally on an area of 1 sq. ft.
 - 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.
 1. Temperature Change: 120 deg F, ambient; 180 deg F, 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: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.
 1. Provide type of bracket with predrilled hole for exposed bolt anchorage and that provides 1-1/2-inch clearance from inside face of handrail to finished wall surface.

2.4 STEEL RAILINGS

- A. Tubing: ASTM A500 (cold formed) or ASTM A513.

- B. Pipe: ASTM A53/A53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
 - 1. Provide galvanized finish for exterior installations and where indicated.
- C. Plates, Shapes, and Bars: ASTM A36/A36M.
- D. Cast Iron Fittings: Either gray iron, ASTM A48/A48M, or malleable iron, ASTM A47/A47M, unless otherwise indicated.

2.5 STAINLESS STEEL RAILINGS

- A. Tubing: ASTM A554, Grade MT 316L.
- B. Pipe: ASTM A312/A312M, Grade TP 316L
- C. Castings: ASTM A743/A743M, Grade CF 8M or CF 3M.
- D. Plate and Sheet: ASTM A240/A240M or ASTM A666, Type 316L.

2.6 FASTENERS

- A. General: Provide the following:
 - 1. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A153/A153M or ASTM F2329 for zinc coating.
 - 2. Stainless-Steel Railings: Type 304 stainless-steel fasteners.
 - 3. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.
- 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 exposed fasteners are unavoidable or are the standard fastening method for railings indicated.
 - 2. Provide Phillips square or hex socket flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to 6 times the load imposed when installed in unit masonry and 4 times the load imposed when installed in concrete, as determined by testing according to ASTM E488/E488M, conducted by a qualified independent testing agency.
 - 1. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941, Class Fe/Zn 5, unless otherwise indicated.
 - 2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F593, and nuts, ASTM F594.

2.7 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
 - 1. For stainless-steel 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.
- B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
- C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- D. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting".
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 - 1. Water-Resistant Product: At exterior locations and where indicated provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

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. Shop assemble railings 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 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 are exposed to weather in a manner that excludes 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 steel 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. Form Changes in Direction as Follows:
1. As detailed.
 2. By bending or by inserting prefabricated elbow fittings.
- J. 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.
- K. Close exposed ends of railing members with prefabricated end fittings.
- L. 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 or less.
- M. 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 prevent bracket or fitting rotation and crushing of substrate.
- N. 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.
- O. For railing posts set in concrete, core drill concrete, or provide steel stainless-steel sleeves not less than 6 inches long with inside dimensions not less than 1/2 inch greater than outside dimensions of post, with metal plate forming bottom closure.
- P. Picket Infill: 1/2-inch- square pickets spaced less than 4 inches clear.

2.9 STEEL AND IRON FINISHES

- A. Galvanized Railings:
1. Hot-dip galvanize exterior steel railings and any other that are indicated, including hardware, after fabrication.
 2. Comply with ASTM A123/A123M for hot-dip galvanized railings.
 3. Comply with ASTM A153/A153M for hot-dip galvanized hardware.
 4. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 5. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

- C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

2.10 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines, or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches.
- C. Stainless Steel Tubing Finishes:
 - 1. 320-Grit Polished Finish: Oil-ground, uniform, fine, directionally textured finish.
- D. Stainless Steel Sheet and Plate Finishes:
 - 1. Directional Satin Finish: ASTM A489/A480, No. 4.
- E. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

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 are 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 are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
 - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 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.
- 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, with a heavy coat of bituminous paint, concealed surfaces of aluminum that are in contact with grout, concrete, masonry, wood, or dissimilar metals.
- 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. 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.
- B. 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 beyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inches of post.
 - 1. Provide at intervals of not more than 30 feet.

3.4 ANCHORING POSTS

- A. Use metal sleeves preset and anchored into concrete for installing posts. After posts are inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- B. Form or core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.
- C. Cover anchorage joint with flange of same metal as post, attached to post with set screws.
- D. Leave anchorage joint exposed with 1/8-inch buildup, sloped away from post.
- E. 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 stainless-steel pipe railings, weld flanges to post and bolt to supporting surfaces.
 - 2. For steel pipe railings, weld flanges to post and bolt to metal supporting surfaces.
- F. Install removable railing sections, where indicated, in slip-fit metal sockets cast in concrete.

3.5 ATTACHING RAILINGS

- A. Anchor railing ends at walls with round flanges anchored to wall construction and connected to railing ends using nonwelded connections.
- B. Anchor railing ends to metal surfaces with flanges bolted to metal surfaces and connected to railing ends using nonwelded connections.
- C. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.
- 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 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.
4. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.

3.6 ADJUSTING AND CLEANING

- A. Clean stainless steel by washing thoroughly with clean water and soap and rinsing with clean water.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting".
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas, and repair galvanizing to comply with ASTM A780/A780M.

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

SECTION 057300

DECORATIVE METAL RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Stainless steel decorative railings (interior use).

B. Related Requirements:

1. Section 055213 "Pipe and Tube Railings" for non-ornamental railings fabricated from pipes and tubes.
2. Section 061053 "Miscellaneous Rough Carpentry" for wood blocking for anchoring railings.

1.2 COORDINATION AND SCHEDULING

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible.

- 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 items to Project site in time for installation.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

A. Product Data:

1. Manufacturer's product lines of decorative metal railings assembled from standard components.
2. Stainless steel cable and cable fittings.
3. Fasteners.
4. Post-installed anchors.
5. Handrail brackets.
6. Nonshrink, nonmetallic grout.
7. Anchoring cement.
8. Metal finishes.

- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

- C. Shop Drawings: Include plans, elevations, sections, and attachment details.

- 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. Cable and cable hardware and connections.
- E. Delegated Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Mill Certificates: Signed by manufacturers of stainless steel products, certifying that products furnished comply with requirements.
- G. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel in accordance with the following:
 - 1. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect mechanical finishes on exposed surfaces of railings from damage by applying a strippable, temporary protective covering before shipping.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design railings, including attachment to building construction.
- B. Structural Performance: Railings, including attachment to building construction, are to 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. applied in any direction.
 - b. Concentrated load of 200 lbf 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 applied horizontally on an area of 1 sq. ft.
 - 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, ambient; 180 deg F, material surfaces.

2.2 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.

2.3 STAINLESS STEEL DECORATIVE RAILINGS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. AGS Stainless Inc.; Prefabricated Ornamental Railing.
 - 2. Livers Bronze; Mirage.
 - 3. Morse Industries; Stainless Steel Cable System.
 - 4. R & B Wagner, Inc.; Invisaware.
 - 5. VIVA Railings, LLC.; CIRCA.
- B. Source Limitations: Obtain stainless steel decorative railing components from single source from single manufacturer.
- C. Design: Drawings indicate general requirements of railings. Design intent is as follows:
 - 1. Post: Round tube made from stainless steel, minimum 1-1/2" diameter.
 - a. With post mounted decorative stem reducer or tapered top, where post meets top rail.
 - 2. Top Rail: Stainless steel. pipe with round cross section shape, minimum 1-1/2" diameter.
 - 3. Hand Rails: Stainless steel. pipe with round cross section shape, maximum 1-1/2" outside diameter.
 - a. Support on posts with cast stainless steel brackets.
 - 4. Infill Panel: Stainless steel cable.
- D. Tubing: ASTM A554, Grade MT 304.
- E. Pipe: ASTM A312/A312M, Grade TP 304.
- F. Castings: ASTM A743/A743M, Grade CF 8 or CF 20.
- G. Plate, Sheet, and Strip: ASTM A240/A240M or ASTM A666, Type 304.
- H. Flat Bar: ASTM A666, Type 304.
- I. Bars and Shapes: ASTM A276/A276M, Type 304.
- J. Stainless Steel Cable and Cable Fittings:

1. Products to be provided by the railing manufacturer or one of the following:
 - a. Loos & Co. Inc.
2. Cable: 1-by-19 wire cable made from wire complying with ASTM A492, Type 316.
 - a. Cable Diameter: 3/16 inch.
 - b. Finish: Mill.
3. Cable Fittings: Connectors of types indicated, fabricated from stainless steel, and with capability to sustain, without failure, a load equal to minimum breaking strength of cable with which they are used.
 - a. Swageless hardware wherever practical.
 - b. Tension fittings; threaded eye and bolt tensioners.
4. Intermediate Cable Supports: Stainless steel flat bar, 1/4-by-1-inch, predrilled.
5. Cable Grommets: For prevention of abrasion of intermediate posts, end posts, and cable braces bored for cables.
 - a. Material: Black, UV-resistant Delrin or approved equal.

2.4 FASTENERS

A. Fastener Materials:

1. Stainless Steel Railing Components: Type 304 stainless steel fasteners.
2. Dissimilar Metal Railing Components: Type 304 stainless steel fasteners.
3. Finish exposed fasteners to match appearance, including color and texture, of railings.

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 and capable of withstanding design loads.

C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless exposed fasteners are unavoidable.

1. Provide tamper-resistant flat-head machine screws for exposed fasteners unless otherwise indicated.

D. Post-Installed Anchors: Fastener systems with working capacity greater than or equal to the design load, in accordance with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193.

1. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless steel bolts, ASTM F593 and nuts, ASTM F594.

2.5 MISCELLANEOUS MATERIALS

A. Handrail Brackets: Cast stainless steel, center of handrail 2-1/2 inches from face of railing or wall.

1. Provide cast-metal brackets with flange tapped for concealed anchorage to threaded hanger bolt.

B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

1. For stainless steel 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.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- E. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.
 1. Water-Resistant Product: Provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.6 FABRICATION

- A. 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. Shop assemble railings to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations.
 1. Clearly mark units for reassembly and coordinated installation.
 2. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately.
 1. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated.
 2. 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.
 1. Provide weep holes where water may accumulate.
 2. Locate weep holes in inconspicuous locations.
- 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 welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Finish #1 welds; ornamental quality with no evidence of a welded joint.

- I. 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.
- J. Mechanical Connections: Connect members with concealed mechanical fasteners and fittings.
 - 1. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.
 - 2. Fabricate splice joints for field connection using an epoxy structural adhesive if this is manufacturer's standard splicing method.
- K. Form changes in direction as follows:
 - 1. By radius bends that will not result in distortion of railing member or by inserting prefabricated elbow fittings of radius indicated.
- L. 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.
- M. Close exposed ends of hollow railing members with prefabricated cap and end fittings of same metal and finish as railings.
- N. 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 or less.
- O. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, handrail brackets, 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.
- P. Provide inserts and other anchorage devices for connecting railings to concrete or masonry Work.
 - 1. Fabricate anchorage devices capable of withstanding loads imposed by railings.
 - 2. Coordinate anchorage devices with supporting structure.
- Q. Stainless Steel Cable Guard Infill: Fabricate cable guard infill assemblies in the shop to field-measured dimensions with fittings machine swaged.
 - 1. Minimize amount of turnbuckle take-up used for dimensional adjustment, so maximum amount is available for tensioning cable.
 - 2. Tag cable assemblies and fittings to identify installation locations and orientations for coordinated installation.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.

- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. 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.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.8 STAINLESS STEEL FINISHES

- A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.
- B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.
 - 1. Run grain of directional finishes with long dimension of each piece.
 - 2. When polishing is completed, passivate and rinse surfaces.
 - 3. Remove embedded foreign matter and leave surfaces chemically clean.
- C. Stainless Steel Tubing Finishes:
 - 1. 180-Grit Polished Finish: Uniform, directionally textured finish.
 - 2. 320-Grit Polished Finish: Oil-ground, uniform, fine, directionally textured finish.
- D. Stainless Steel Sheet and Plate Finishes:
 - 1. Directional Satin Finish: ASTM A480/A480M, No. 4.

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. Perform cutting, drilling, and fitting required for installing railings.
 - 1. Fit exposed connections together to form tight, hairline joints.
 - 2. Install railings level, plumb, square, true to line; without distortion, warp, or rack.
 - 3. Set railings accurately in location, alignment, and elevation; measured from established lines and levels.
 - 4. 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.
 - 5. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
 - 6. 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.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1. Coat concealed surfaces that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- 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. 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 beyond joint on either side; fasten internal sleeve securely to one side; and locate joint within 6 inches of post.

3.4 ANCHORING POSTS

- A. Precast Concrete Stair Treads: Post bottom flange to be through bolted depth of tread or landing precast concrete and metal pan and fastened with locking washer and nut.
- B. Floor Slab Edges: Core-drill holes not less than 5 inches deep and 3/4 inch larger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout or anchoring cement, mixed and placed to comply with anchoring material manufacturer's written instructions.
- C. Cover anchorage joint with flange of same metal as post, attached to post with setscrews.
- D. Anchor posts with flanges, connected to posts are as follows:
 1. For stainless steel railings, weld flanges to posts and bolt through substrates as indicated.

3.5 ATTACHING RAILINGS

- A. Anchor railing ends to concrete and masonry with sleeves concealed within railing ends and anchored to wall construction with anchors and bolts.
- B. Attach handrails to walls with wall brackets, except where end flanges are used. Provide brackets with 1-1/2-inch clearance from inside face of handrail and finished wall surface.
 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.
- C. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.
2. For hollow masonry anchorage, use toggle bolts.
3. For steel-framed partitions, use hanger or lag bolts set into wood backing between studs. Coordinate with stud installation to locate backing members.
4. For steel-framed partitions, fasten brackets directly to steel framing or concealed 16 gage steel reinforcement using self-tapping screws of size and type required to support structural loads.
5. For steel-framed partitions, fasten brackets with toggle bolts installed through flanges of 16 gage steel framing or through concealed steel reinforcements.

3.6 CABLE RAILING INFILL INSTALLATION

- A. Install cable railing system in accordance with manufacturer's instructions at locations indicated on the drawings.
 1. Install cable railing system plumb, level, square, and rigid.
 2. Anchor cable railing system to mounting surfaces.
 3. Use manufacturer's supplied cable hardware.
 4. Terminate and tension cables in accordance with manufacturer's instructions.
 5. Tension cables to a minimum of 225 pounds each in sequence in accordance with manufacturer's instructions.
 6. Ensure cables are clean, parallel to each other, and without kinks or sags.

3.7 CLEANING

- A. Clean stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.

3.8 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

SECTION 061053

MISCELLANEOUS ROUGH CARPENTRY

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, but is not limited to the following:

- 1. Wood blocking and nailers.
- 2. Plywood backing panels.

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NHLA: National Hardwood Lumber Association.
 - 3. NLGA: National Lumber Grades Authority.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWPA: Western Wood Products Association.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
 - 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
 - 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Evaluation Reports: For the following, from ICC-ES:
 1. Preservative-treated wood.
 2. Fire-retardant-treated wood.
 3. Power-driven fasteners.
 4. Powder-actuated fasteners.
 5. Expansion anchors.
 6. Metal framing anchors.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. For exposed lumber indicated to receive a stained or natural finish, omit grade stamp and provide certificates of grade compliance issued by grading agency when requested by Authority Having Jurisdiction.
 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 19 percent.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.
 - 2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
 - 1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency when requested by Authority Having Jurisdiction.
- D. Application: Pressure treated wood as indicated on the drawings and in the following locations that are not required to be fire-retardant.
 - 1. Wood placed in direct contact with soil or subject to insect infestation.
 - 2. Wood placed in direct contact with concrete, concrete masonry or any below grade application subject to moisture over time.
 - 3. Wood exposed to exterior weather.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
 - 4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.

- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. For exposed lumber indicated to receive a stained or natural finish, omit marking and provide certificates of treatment compliance issued by inspection agency.
- E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: FRT Wood as indicated on Drawings and the following locations:
 - 1. Schedule – Provide FRT materials as follows:
 - a. Plywood backing panels.
 - b. Framing at locations listed below.
 - 2. Fire-retardant-treated wood framing may be used in non-combustible Construction Types per the following:
 - a. Combustible materials shall be permitted in buildings of Type I or Type II construction in the following applications and in accordance with the 2017 Ohio Building Code, Section 603.1 Allowable Materials, Items 1.1 through 1.3:
 - b. Fire-retardant-treated wood shall be permitted in:
 - 1) 1.1 Nonbearing partitions where the required fire-resistance rating is 2 hours or less.
 - 2) 1.2 Nonbearing exterior walls where no fire rating is required.
 - 3) 1.3 Roof construction, including girders, trusses, framing and decking.
 - a) Exception: In Buildings of Type IA Construction exceeding two stories in height, fire-retardant-treated wood is not permitted in roof construction when the vertical distance from the upper floor to the roof is less than 20 feet.
 - 3. Wood blocking is not required to be fire-retardant treated in the three locations listed and described above (nonbearing partitions, nonbearing exterior walls and roof construction that are fire-retardant treated framing) per the 2017 Ohio Building Code, Section 603.1 Allowable Materials, Items 12 and 18:
 - a. 12. Blocking such as for handrails, millwork, cabinets and windows and door frames.
 - b. 18. Nailing or furring stripes as permitted by Section 803.1.1.

2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including, but not limited to the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Rooftop equipment bases and support curbs.
 - 4. Cants.
 - 5. Furring.

6. Grounds.
 7. Utility shelving.
- B. For items of dimension lumber size, provide Construction or No. 2 and maximum moisture content of 19 percent.
- C. For concealed boards, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
1. Mixed southern pine, No. 2 grade; SPIB.
 2. Hem-fir or hem-fir (north), Construction or No. 2 Common grade; NLGA, WCLIB, or WWPA.
 3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or No. 2 Common grade; NeLMA, NLGA, WCLIB, or WWPA.
 4. Eastern softwoods, No. 2 Common grade; NELMA.
 5. Northern species, No. 2 Common grade; NLGA.
 6. Western woods, Construction or No. 2 Common grade; WCLIB or WWPA.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.
- F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.5 PLYWOOD BACKING PANELS

- A. Telephone and Electrical Equipment Backing Panels: DOC PS 1, Exposure 1, C-D Plugged, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners of Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- D. Wood Screws and Lag Screws: ASME B18.2.1, ASME B18.6.1, or ICC-ES AC233.
- E. Screws for Fastening to Metal Framing: ASTM C 954, length as recommended by screw manufacturer for material being fastened.

- F. Carbon Steel Bolts: ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers all hot-dip zinc coated.
- G. Stainless Steel Bolts: ASTM F593, Alloy Group 1 or 2 with ASTM F594, Alloy Group 1 or 2 hex nuts and, where indicated, flat washers.
- H. Post-Installed Anchors: Chemical or torque-controlled expansion anchors of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
 - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

2.7 MISCELLANEOUS MATERIALS

- A. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
- B. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Where wood-preserved-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
 - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of

member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.

- F. Comply with AWPAC M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- G. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

3.2 WOOD BLOCKING AND NAILER INSTALLATION

- A. Install where indicated and where required for screeding or attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved. Locations include, but are not limited to the following applications:
 - 1. Casework.
 - 2. Miscellaneous and toilet room accessories.
 - 3. Infant changing stations.
 - 4. Shower seats.
 - 5. Automatic door operators.
 - 6. Wall mounted door stops.
 - 7. Wall mounted accessories.
 - 8. Wall mounted fire extinguishers.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION

SECTION 061600

SHEATHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Plywood sheathing.
2. Glass-mat gypsum sheathing.
3. Plywood underlayment.
4. Plywood subflooring.

- B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for plywood backing panels.
2. Section 072726 "Fluid Applied Membrane Air and Water Resistive Barriers" for fluid applied membrane air barrier applied over sheathing and sealing of joints and penetrations of sheathing.
3. Section 142123.16 "Machine Room-Less Electric Traction Passenger Elevators" for plywood underlayment installed in elevator cabs.

1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Include physical properties of treated materials.
3. For fire-retardant treatments, include physical properties of treated plywood both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5516.
4. For products receiving waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

- B. Evaluation Reports: For the following, from ICC-ES:

1. Wood-preservative-treated plywood.
2. Fire-retardant-treated plywood.

C. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

1.4 QUALITY ASSURANCE

A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Stack panels flat with spacers beneath and between each bundle to provide air circulation. Protect sheathing from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-resistance Ratings: As tested according to ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Fire-resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

B. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

2.2 WOOD PANEL PRODUCTS

- A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.
- C. Factory mark panels to indicate compliance with applicable standard.

2.3 PRESERVATIVE-TREATED PLYWOOD (PT Plywood Sheathing)

A. Preservative Treatment by Pressure Process: AWWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

- B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
- C. Application: Treat items indicated on Drawings and the following:
 - 1. Plywood in contact with masonry or concrete that is not required to be fire-retardant.
 - 2. Plywood used with roofing, flashing, vapor barriers, and waterproofing that is not required to be fire-retardant.

2.4 FIRE-RETARDANT-TREATED PLYWOOD (FRT Plywood Sheathing)

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article that are acceptable to authorities having jurisdiction and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
 - 1. Use treatment that does not promote corrosion of metal fasteners.
 - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
 - 3. Design Value Adjustment Factors: Treated lumber plywood shall be tested according to ASTM D 5516 and design value adjustment factors shall be calculated according to ASTM D 6305. Span ratings after treatment shall be not less than span ratings specified.
- C. Kiln-dry material after treatment to a maximum moisture content of 15 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- D. Identify fire-retardant-treated plywood with appropriate classification marking of qualified testing agency acceptable to authorities having jurisdiction.
- E. Application: Treat plywood indicated on Drawings and the following.
 - 1. Roof and wall sheathing within 48 inches of fire or party walls.
 - 2. Roof sheathing.
 - 3. Plywood sheathing in exterior walls, parapets and soffits as a substrate for wall cladding.
 - 4. Fire-retardant-treated wood framing and sheathing may be used in non-combustible Construction Types per the following:
 - a. Combustible materials shall be permitted in buildings of Type I or Type II construction in the following applications and in accordance with The 2017 Ohio Building Code, Section 603.1 Allowable Materials, Items 1.1 through 1.3:
 - b. Fire-retardant-treated wood (sheathing) shall be permitted in:
 - 1) 1.1 Nonbearing partitions where the required fire-resistance rating is 2 hours or less.
 - 2) 1.2 Nonbearing exterior walls where no fire rating is required.
 - 3) 1.3 Roof construction, including girders, trusses, framing and decking.

- a) Exception: In Buildings of Type IA Construction exceeding two stories in height, fire-retardant-treated wood is not permitted in roof construction when the vertical distance from the upper floor to the roof is less than 20 feet.

2.5 PLYWOOD SHEATHING

- A. Plywood Wall and Parapet Sheathing: Either DOC PS 1 or DOC PS 2, Exterior sheathing.
 1. Span Rating: Not less than 24/0.
 2. Nominal Thickness: As indicated on Drawings, but not less than 5/8 inch.

2.6 GLASS-MAT GYPSUM SHEATHING

- A. Glass-Mat Gypsum Sheathing: ASTM C 1177/1177M.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corporation; GlasRoc Sheathing.
 - b. Georgia-Pacific Building Products; Dens-Glass Fireguard Sheathing.
 - c. National Gypsum Company; Gold Bond eXP Fire-Shield Sheathing.
 - d. United States Gypsum Co.; Securock Brand UltraLight Glass-Mat Sheathing.
 2. Type and Thickness: Type X, 5/8" thick.
 3. Size: 48 by 96 inches for vertical installation.

2.7 UNDERLAYMENT (For Elevator Floors)

- A. Plywood Underlayment: DOC PS 1, Exterior, C-C Plugged single-floor panels.
 1. Span Rating: Not less than 24.
 2. Nominal Thickness: Not less than 5/8 inch
 3. Edge Detail: Square.
 4. Surface Finish: Fully sanded face.

2.8 SUBFLOORING (At Wood Flooring)

- A. Plywood Subflooring: DOC PS 1, Exterior, Structural I single-floor panels or sheathing.
 1. Span Rating: Not less than 16.
 2. Nominal Thickness: Not less than 23/32 inch

2.9 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 1. For sheathing, provide fasteners with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

- B. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES-AC70.
- C. Screws for Fastening Plywood Sheathing to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
- D. Screws for Fastening Gypsum Sheathing to Cold-Formed Metal Framing: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing to be attached.
 - 1. For steel framing less than 0.0329-inch-thick, use screws that comply with ASTM C 1002.
 - 2. For steel framing from 0.033 to 0.112-inch-thick, use screws that comply with ASTM C 954.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction, unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
 - 2. ICC-ES evaluation report for fastener.
- D. Coordinate sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.
- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

3.2 PLYWOOD SHEATHING INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
 - 1. Wall and Parapet Sheathing:
 - a. Screw to cold-formed metal framing.
 - b. Space panels 1/8 inch apart at edges and ends.
 - 2. Subflooring: (at Wood Flooring)

- a. Screw to cold-formed metal framing.
 - b. Space panels 1/8 inch apart at edges and ends.
3. Underlayment: (At Elevator Floors)
- a. Screw and glue to metal subflooring.
 - b. Space panels 1/32 inch apart at edges and ends.
 - c. Joints to be staggered and fastened to framing or substrate at 6" on center.
 - d. Apply adhesive and install screws at 12" on center in the field of the boards.
 - e. Fill and sand edge joints of underlayment receiving resilient flooring immediately before installing flooring.

3.3 GYPSUM SHEATHING INSTALLATION

- A. Comply with GA-253 and with manufacturer's written instructions.
1. Fasten gypsum sheathing to cold-formed metal framing with screws.
 2. Install panels with a 3/8-inch gap where non-load-bearing construction abuts structural elements.
 3. Install panels with a 1/4-inch gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.
- B. Apply fasteners so heads bear tightly against face of sheathing boards but do not cut into facing.
- C. Horizontal Installation: Install sheathing with V-grooved edge down and tongue edge up. Interlock tongue with groove to bring long edges in contact with edges of adjacent panels without forcing. Abut ends over centers of studs, and stagger end joints of adjacent panels not less than one stud spacing. Attach at perimeter and within field of panel to each steel stud.
1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.
- D. Vertical Installation: Install vertical edges centered over studs. Abut ends and edges with those of adjacent panels. Attach at perimeter and within field of panel to each stud.
1. Space fasteners approximately 8 inches o.c. and set back a minimum of 3/8 inch from edges and ends of panels.

END OF SECTION

SECTION 064023

INTERIOR ARCHITECTURAL WOODWORK

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. Plastic-laminate-clad architectural cabinets.
2. Cabinet hardware and accessories.
3. Plastic-laminate-clad countertops.
4. Solid-surface countertops.
5. Wood countertops.
6. Slatwall panels.
7. Interior standing and running trim.
8. Closet and utility shelving.
9. Wood furring, blocking, shims, and hanging strips for installing interior architectural woodwork items that are not concealed within other construction.
10. Shop priming of interior architectural woodwork.
11. Shop finishing of interior architectural woodwork.

B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing interior architectural woodwork that are concealed within other construction before interior architectural woodwork installation.

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections, to ensure that interior architectural woodwork can be supported and installed as indicated.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.5 SUBMITTALS

- A. Product Data: For each type of product and the following:

1. Anchors.
 2. Adhesives.
 3. Shop finishing materials.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings:
1. Include plans, elevations, sections, and attachment details.
 2. Show large-scale details.
 3. Show locations and sizes of furring, blocking, and hanging strips, including blocking and reinforcement concealed by construction and specified in other Sections.
 4. Show locations and sizes of cutouts and holes for items installed in architectural cabinets.
- D. Samples for Verification: For the following:
1. Lumber for Transparent Finish: Not less than trim profile wide by 12 inches long for each species and cut, finished on one side and one edge.
 2. Lumber and Panel Products with Shop-Applied Opaque Finish: Not less than trim profile wide by 12 inches long for lumber and 8 by 10 inches for panels, for each finish system and color.
 - a. Finish one-half of exposed surface.
 3. Plastic Laminates: 10 by 10 inches, for each type, color, pattern, and surface finish required.
 4. Solid Surface Material:
 - a. Countertop material, 6 inches square.

1.6 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 mockups of typical interior architectural woodwork as shown on Drawings.
 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Owner specifically approves such deviations by Change Order.
 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Architectural Woodwork Standards, Section 2.
- B. Do not deliver interior architectural woodwork until painting and similar finish operations that might damage woodwork have been completed in installation areas.
- C. Store woodwork in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.
1. Handle and store fire-retardant-treated wood to comply with chemical treatment manufacturer's written instructions.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install interior architectural woodwork until building is enclosed, wet-work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. Field Measurements: Where interior architectural woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings.
 - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being concealed by construction, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where interior architectural woodwork is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.9 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that architectural woodwork can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOODWORK, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the AWI/AWMAC/WI's "Architectural Woodwork Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
 - 1. The Contract Documents contain requirements that are more stringent than the Architectural Woodwork Standards. Comply with Contract Documents and Architectural Woodwork Standards.

2.2 PLASTIC-LAMINATE-CLAD ARCHITECTURAL CABINETS (Plastic Laminate Cabinets)

- A. Architectural Woodwork Standards Grade: Custom.
- B. Design: Frameless cabinet construction with the following door and drawer-front style:
 - 1. Flush overlay.
- C. Pattern or Wood Grain Direction for Plastic Laminate:
 - 1. Doors: Vertical with continuous vertical matching.
 - 2. Drawer Fronts: Vertical with continuous vertical matching.
 - 3. Face Frame Members or Valence: Lengthwise.

4. End Panels: Vertical.
 5. Bottoms and Tops of Units: Side to side.
 6. Knee Space Panels: Vertical.
 7. Aprons: Horizontal.
- D. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or if not indicated, as required by quality standard.
1. Horizontal Surfaces: Grade HGS 0.048 inch nominal thickness.
 2. Vertical Surfaces: Grade VGP 0.028 inch nominal thickness.
 3. Cabinet Liner: Grade CLS 0.020 inch nominal thickness.
 4. Backer Laminate: Grade BKL 0.020 inch nominal thickness.
 5. Postformed Surfaces: Grade HGP 0.036 inch nominal thickness.
- E. 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 by manufacturer's designations on the drawings.
- F. Edgebanding: PVC, 0.12-inch (3mm) thick unless indicated otherwise, matching laminate in color, pattern, and finish.
1. Product: REHAU FlexEdge, or product that complies with requirements by the following manufacturers:
 - a. Doellken.
 - b. Charter Industries.
- G. Exposed Exterior Surfaces: All exterior surfaces exposed to view.
1. Exposed Surfaces Materials: Plastic Laminate, NEMA LD 3, as indicated.
 - a. Horizontal Surfaces: Grade HGS.
 - b. Vertical Surfaces: Grade VGP.
 - c. Door and Drawer Edges: PVC edge banding 0.12 inches (3mm) thick.
- H. Exposed Interior Surface: All interior surfaces exposed to view in open casework or behind transparent doors.
1. Exposed Interior Surface Materials: Plastic Laminate, NEMA LD 3, as indicated.
 - a. Interior faces of cabinet sides or back that have exposed plastic laminate surfaces: Grade VGS.
 - b. Interior face of horizontal surfaces: Grade HGS.
 - c. Cabinet Shelving: Grade HGS unless otherwise indicated.
 - 1) PVC edge banding 0.12 inches (3mm) thick on all four edges.
- I. Semi-Exposed Surfaces: All interior surfaces exposed to view when doors or drawers are open.
1. Semi-Exposed Interior Surface Materials: Thermally Fused Laminate (TFL) Panels. Provide thermally fused laminate panels for the following semiexposed surfaces unless otherwise indicated.
 - a. Interior faces of ends (sides), back, top and bottom.

- b. Interior faces of cabinet doors and drawer fronts.
 - c. Cabinet Shelving.
 - 1) Edges of Thermally Fused Laminate Panel Shelves: PVC edge banding 0.12 inches (3mm) thick on the front edge all four edges.
 - d. Drawer Sides and Backs.
 - e. Drawer Bottoms.
2. Concealed Backs of Panels with Exposed Plastic Laminate or TFL Surfaces: High-pressure decorative laminate, NEMA LD 3, Grade BKL.
- J. Plastic-Laminate-Clad Cabinet Construction: As required by referenced quality standard, but not less than the following:
- 1. Bottoms and Ends of Cabinets, and Tops of Wall Cabinets and Tall Cabinets: 3/4-inch particleboard.
 - 2. Shelves: 3/4-inch- thick particleboard.
 - a. Shelves over 36 inches - 3/4-inch- thick plywood or 1-inch- thick particleboard.
 - 3. Backs of Casework: 1/2-inch- thick particleboard or MDF where exposed, dadoed into sides, bottoms, and tops where not exposed.
 - 4. Drawer Fronts: 3/4-inch particleboard subfronts and fronts.
 - a. Fasten exposed fronts to subfront with mounting screws from interior of body.
 - 5. Drawer Sides and Backs: 1/2-inch- thick particleboard or MDF, with glued dovetail or multiple-dowel joints.
 - a. Join subfronts, backs, and sides with glued rabbeted joints supplemented by mechanical fasteners or glued dovetail joints.
 - 6. Drawer Bottoms: 1/4-inch- thick particleboard or MDF glued and dadoed into front, back, and sides of drawers.
 - a. Use 1/2-inch material for drawers more than 24 inches wide.
 - 7. Doors 48 Inches High or Less: 3/4 inch thick, with particleboard or MDF cores.
 - 8. Doors More Than 48 Inches High: 1-1/8 inches thick, with particleboard cores.
 - 9. Stiles and Rails of Glazed Doors 48 Inches High or Less: 3/4 inch thick, with particleboard cores.
 - 10. Stiles and Rails of Glazed Doors More Than 48 Inches High: 1-1/16 inches thick, with solid wood or 1-1/8 inches thick, with particleboard cores.
- K. Filler Strips: Provide where shown or as needed, to close spaces between casework and walls, ceilings, and equipment. Fabricate from same material and with same finish as casework.
- 1. Provide filler strips at the underside of wall cabinets installed against side walls.

2.4 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets.

- B. Butt Hinges: 2-3/4-inch, 5-knuckle steel hinges made from 0.095-inch- thick metal, and as follows:
1. Semi-concealed Hinges for Overlay Doors: BHMA A156.9, B01521.
 2. Manufacturer/Product: Rockford Process Control, No. 376 or product that complies with requirements by the following manufacturer:
 - a. Hafele.
 - b. Amerock.
 - c. Liberty Hardware.
 3. Typical hinge for all architectural cabinets unless noted otherwise.
- C. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 120 plus degrees of opening, self-closing.
1. Manufacturer/Product: BLUM No. 73T5580 or product that complies with requirements by the following manufacturer:
 - a. Grass America.
 2. Specialty hinge for use at cabinet locations in Large Conference Room No. 110.
- D. Wire Pulls: Back mounted, solid metal, 4 inches long, 5/16 inch in diameter.
1. Manufacturer/Product: Rockford Process Control Wire Pull No. P604 or product that complies with requirements by the following manufacturer:
 - a. Doug Mockett and Co., Inc.
 - b. EPCO
 - c. Hafele
- E. Catches: Magnetic catches, BHMA A156.9, B03141.
1. Manufacturer/Product: Hafele Magnetic Catch No. 246.29.703. Typical catch for all architectural cabinets, unless noted otherwise. Provide one catch for each door.
- F. Shelf Rests: BHMA A156.9, B04013; two-pin plastic with shelf hold-down clip.
1. Manufacturer/Product: Hafele., Shelf Support, Heavy Duty,
 - a. Double pins, 05 mm each at 32 mm.
 - b. Locks down 3/4" or 1" shelves.
 - c. Color: White.
- G. Drawer Slides: BHMA A156.9, B05091.
1. Unless noted otherwise, drawer slides are Heavy Duty (Grade 1HD-100 and Grade 2HD-200): Side mounted; full extension type; zinc-plated steel ball-bearing slides.
 2. Basis of Design: Subject to compliance with requirements. Provide Knappe and Vogt (KV) products listed or comparable products by the following:
 - a. Accuride.
 3. Box Drawer Slides: For drawers not more than 6 inches high and 24 inches wide.

- a. KV 8400, 100 lb. capacity (medium duty).
 4. File Drawer Slides: For drawers more than 6 inches high or 24 inches wide.
 - a. KV 8500, 150 lb. capacity.
 5. Lateral file Drawer Slides: For drawers more than 24 inches wide, but not more than 42 inches wide.
 - a. KV 8520, 175 lb. capacity.
 6. Drawers requiring extra heavy-duty slides (trash bin, tool drawer): For drawers marked as "Heavy Duty":
 - a. KV 8800, 200 lb. capacity.
- H. Wire Management Tray (WMT):
1. Manufacturer/Product: Doug Mockett and Company, Inc., WM9/MF.
 2. Dimensions: 3 5/8 inches high by 3 inches wide by 2 feet 0 inches long.
 3. Color: Black.
- I. Countertop Support Brackets (CA-X):
1. Type CA-1: Painted steel brackets with concealed vertical leg; 2 by 2 inches by 1/4-inch-thick and horizontal T shape and 2 by 2 inches by 1/4-inch-thick vertical angle.
 - a. Manufacturer/Product: A & M Hardware 2.0" Concealed Brackets or equal fabricated product.
 - b. Size: Bracket to be countertop depth less 3 inches maximum with vertical dimension of 2 feet.
 - 1) Model: C (2.0) 21 for typical 24 to 25 inch countertops. Verify sizes required.
 - c. Color: White.
 2. Type CA-2: Painted steel brackets, surface mounted; 1 1/2 inch flange by 1/8-inch-thick angle profile with tapering legs. For use at masonry walls and where indicated.
 - a. Manufacturer/Product: A & M Hardware Standard Brackets or equal fabricated product.
 - b. Size: Bracket to be countertop depth less 3 inches maximum with vertical dimension.
 - 1) Model: 21x21 for typical 24 to 25-inch countertops. Verify sizes required.
 - c. Color: White 933-58.
 3. Type CA-3: Primed steel brackets, surface mounted; 6 inch by 2-1/2 inch wall plate, 15 inch long tapered leg with 1-inch flange. For use at casework where indicate d or as required.
 - a. Manufacturer/Product: Hafele Work Surface Performance bracket, heavy duty No. 287.73.501.
 - b. Color: Factory primed, to be painted white.
- J. Sliding Glass Assembly (SGA): Manufacturer, CR Laurence Co., Inc.

1. CRL Model 80 EZ-Slide Top Hung Door System CRL3301 (No counter tracks) for 3/8" Glass
 - a. Provide system for each panel of assembly.
 - b. Provide CRL Showcase Stick-On Finger Pulls, No FP86 silver.

 - K. Door Locks: BHMA A156.11, E07121.
 1. Hafele National Lock No. C-8053.
 2. Provide strikes, rosettes, etc. as required by application for complete installation.

 - L. Drawer Locks: BHMA A156.11, E07041.
 1. Hafele National Lock No. C-8053.
 2. Provide strikes, rosettes, etc. as required by application for complete installation.

 - M. Hanging File Rails: Black plastic rails, snaps onto top of 1/2" drawer sides, full depth of drawers.
 1. Product No. 422.72.381 by Hafele. Provide a pair of hanging file rails at all file drawers and as indicated on drawings.

 - N. Grommets for Cable Passage through Countertops: 2-1/2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage.
 1. Product: Subject to compliance with requirements, provide "EDP 3" by Doug Mockett & Company, Inc.
 - a. Color selected by Architect from manufacturer's full range. There can be an individual color for each laminate type or solid surface color.

 - O. Trash Liner Grommets for Countertops: 8-inch by 3-inch deep, satin stainless steel grommet trim and vertical liner for trash drop through countertops.
 1. Product: Subject to compliance with requirements, provide "TM2C/SSS" (Satin Stainless Steel) by Doug Mockett & Company, Inc.

 - P. Clothes Rod (CR-1): Knappe & Vogt 750 1 Series Closet Rod (length as required) w/Knappe & Vogt 734 CHR flanges.

 - Q. Clothes Hooks: 13/32-inch diameter hook with 2-inch base and separate cover plate, 1-19/32-inch projection, Satin Stainless Steel.

 - R. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
 1. Satin Stainless Steel: BHMA 630.

 - S. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
- 2.5 PLASTIC-LAMINATE-CLAD COUNTERTOPS (Plastic Laminate Countertops)
- A. Grade: Custom.

- B. High-Pressure Decorative Laminate: NEMA LD 3, Grade HGS.
- C. 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 by manufacturer's designations on the drawings.
- D. Edge Treatment: 0.12-inch (3mm) PVC edging matching laminate in color, pattern and finish.
- E. Core Material: Particleboard made with exterior glue.
- F. Core Material at Sinks: Particleboard made with exterior glue.
- G. Core Thickness: 3/4 inch.
 - 1. Build up countertop thickness to 1-1/2 inches at front, back, and ends with additional layers of core material laminated to top.
- H. Backer Sheet: Provide plastic-laminate backer sheet, NEMA LD 3, Grade BKL, on underside of countertop substrate.
- I. Paper Backing: Provide paper backing on underside of countertop substrate.

2.6 SOLID SURFACE COUNTERTOPS

- A. Solid Surface Material (SS): Homogeneous-filled plastic resin complying with ICPA SS-1.
 - 1. Basis of Design: Subject to compliance with requirements, provide solid surface material as indicated on drawings or comparable products by one of the following:
 - a. Corian by Dupont.
 - b. Wilsonart International
 - 2. Type: Provide Standard type unless Special Purpose type is indicated.
 - 3. Integral Sink Bowls: Comply with CSA B45.5/IAPMO Z124.
 - 4. Finish: DuPont Corian's standard matte finish, gloss range of 5-20.
 - 5. Colors and Patterns: As indicated by manufacturer's designations on the drawings.
- B. Core Material: Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
- C. Fabricate countertops according to solid surface material manufacturer's written instructions and to the AWI/AWMAC/WI's "Architectural Woodwork Standards."
 - 1. Grade: Custom.
- D. Configuration:
 - 1. Front: Straight, slightly eased at top edge with 1/8-inch radius.
 - 2. Backsplash: Straight, slightly eased top and side edges with 1/8-inch radius.
 - 3. End Splash: Matching backsplash.
- E. Countertops: 1/2-inch- thick, solid surface material with front edge built up with same material.

- F. Backsplashes: 1/2-inch- thick, solid surface material.
- G. Fabricate tops with shop-applied edges unless otherwise indicated. Comply with solid surface material manufacturer's written instructions for adhesives, sealers, fabrication, and finishing.
 - 1. All inside corners of L and U shaped installations require a minimum 1/2" radius to reduce corner stress.
 - a. Inside corners less than 90 degrees require a 1" minimum radius.
 - b. Seams in built up front edges must be a minimum of 1" past the inside corner radius.
 - 2. Fabricate with loose backsplashes for field assembly.
 - 3. Install integral sink bowls in countertops in the shop.
- H. Joints: Fabricate countertops without joints, in one piece unless otherwise indicated. When required, fabricate countertops in sections for joining in field, with joints at locations indicated.
 - 1. Joint Locations: Not within 18 inches of a sink or cooktop and not where a countertop section less than 36 inches long would result, unless unavoidable.
 - 2. Splined Joints: Accurately cut kerfs in edges at joints for insertion of metal splines to maintain alignment of surfaces at joints. Make width of cuts slightly more than thickness of splines to provide snug fit. Provide at least three splines in each joint.
- I. Cutouts and Holes:
 - 1. Undercounter Plumbing Fixtures: Make cutouts for fixtures in shop using template or pattern furnished by fixture manufacturer. Form cutouts to smooth, even curves.
 - a. Provide vertical edges, slightly eased at juncture of cutout edges with top and bottom surfaces of countertop and projecting 3/16 inch into fixture opening.
 - 2. Counter-Mounted Plumbing Fixtures: Prepare countertops in shop for field cutting openings for counter-mounted fixtures. Mark tops for cutouts and drill holes at corners of cutout locations. Make corner holes of largest radius practical.
 - 3. Fittings: Drill countertops in shop for plumbing fittings, undercounter soap dispensers, and similar items.
- J. Integral Solid Surface Sink Bowls: Units to meet or exceed requirements of ANSI Z124.3 and ANSI Z124.6.
 - 1. Colors: To match countertops.
 - 2. Coordinate sinks listed with Plumbing Drawings and Schedules for faucets and drain assemblies.
 - 3. Manufacturer/Model No.: See Plumbing Drawings.

2.7 WOOD COUNTERTOPS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of wood countertop and quality grade specified unless otherwise indicated.
- B. Architectural Woodwork Standards Grade: Custom.
- C. Butcher-Block Countertops: For transparent finish. Fabricated from narrow strips of lumber glued together and arranged for random mix of color and grain.

1. Wood Species: Hard maple.
2. Strip Thickness: 1-1/2 inches.
3. Shop Finish: Transparent finish.

D. Fabricate wood countertops to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:

1. Solid-Wood Members: 1/8 inch unless otherwise indicated.

2.8 SLATWALL PANELS

A. Slatwall Panels: T-Grooved wood composite 3/4" thick panels, pre-engineered and machined for use with groove inserts and retail display hardware.

1. Attachment System: Direct fastening of slatwall to metal stud framing or wood blocking.
2. Panels: High Pressure Laminate adhered to wood fiber substrate and having a balancing backer sheet.
3. Panels to conform to Ohio Building Code requirements for interior finishes for smoke and flame spread per ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials, Class C.

B. Basis of Design: Subject to compliance with requirements provide Marlite Slatwall Panels.

1. Panel Configuration: Engineered groove machined into wood composite substrate.
 - a. Panel thickness – 3/4" thick with nominal 1/2" deep slotted groove.
 - b. Panel face dimensions: As indicated on the drawings.
 - c. Slatwall panels grooves machined on 3" centers.
2. High internal bond wood composite substrate. Slatwall panels shall have formaldehyde emissions of 0.3 PPM or less and shall comply with HUD 24 CFR Part 3280 Standards set fourth for particleboard panels.
 - a. Slatwall EQ
 - 1) High pine particleboard, industrial grade. NAF (No-Added Formaldehyde). 100% post-industrial recycled/recovered content. CARB exempt. Physical properties tested using method ASTM D1037-06.

C. Panel Finish:

1. High Pressure Laminate: Vertical grade 0.030" (0.762mm) thick high pressure plastic laminate adhered to wood fiber substrate by cold pressing polyvinyl acetate (PVA) type II, water resistant adhesives.
 - a. Edges - Square, and sealed, to provide a black edge.
 - b. Balancing Backer: Kraft Paper that does not contribute to or pose an unusual additional fire hazard.
 - c. Color and Pattern: As selected by Architect from manufacturer's standard selection.

D. Groove Treatment and Trim Groove Treatment:

1. Marlite 7000 Series: Factory installed aluminum insert –mill finished.
2. Panel Trim:

- a. Outside/Inside Corner –Marlite A760, 1" x 1" x 8'- 0" aluminum mill finish.
- b. Edge –Marlite A770 1/2" x 3/4" x 8'- 0" aluminum mill finish.

E. Installation Accessories:

1. Phillips, bugle head, coarse threaded screws.
2. Adhesives: Marlite Brand SS5262 Heavy Duty C-109 solvent based adhesive unless otherwise approved by Marlite.

F. Products Not Furnished or Installed under This Section:

1. Display fixtures, hooks, or brackets arms.

G. Fabrication:

1. All framing, panels, hardware and accessories shall be factory finished and ready to install except for field fabrication required by perimeter and corner conditions.
2. Refinish field cut panel edges in accordance with manufacturer's instruction before installation.
3. Fabrication Tolerances for panels:
 - a. Dimensional: ± 0.0625 ".
 - b. Square: ± 0.125 " across diagonals.
 - c. Thickness: ± 0.008 ".
 - d. Grooving: ± 0.031 " (groove width and spacing between grooves)

2.9 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH (Wood Trim Stained)

A. Architectural Woodwork Standards Grade: Custom.

B. Hardwood Lumber Trim for Transparent Finish (Stain or Clear Finish):

1. Species: White maple.
2. Cut: Rift cut/rift sawn.
3. Wood Moisture Content: 5 to 10 percent.
4. For trim items wider than available lumber, use veneered construction. Do not glue for width.
 - a. For veneered base, use hardwood lumber core, glued for width.
5. For rails thicker than available lumber, use veneered construction. Do not glue for thickness.
6. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

2.10 INTERIOR STANDING AND RUNNING TRIM FOR OPAQUE FINISH (Wood Trim Painted)

A. Architectural Woodwork Standards Grade: Custom.

B. Lumber Trim for Opaque Finish (Painted Finish):

1. Wood Species: Any closed-grain hardwood.
2. Wood Moisture Content: 5 to 10 percent.
3. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.

2.11 CLOSET AND UTILITY SHELVING

- A. Architectural Woodwork Standards Grade: Custom.
- B. Shelf Material: HGS High-Pressure Decorative Laminate (Plastic Laminate Shelving) on both sides of 3/4-inch particle board with exterior glue.
 - 1. 0.012 PVC edge banding
- C. Cleats: Same 3/4-inch panel product as shelving.
- D. Closet Rods: 1-5/16-inch-diameter, chrome-plated-steel tubes with wall mounting flanges, with matching finish, complying with BHMA A156.16, L03131.
 - 1. Product: Knap & Vogt 750 1 Series Extra Heavy-Duty Round Closet Rod with 734 Wall-Mounted Flange.
- E. Adjustable Shelf Standards and Brackets:
 - 1. Knap & Vogt No. 87 Super Duty single slot standard with No. 187LL bracket for 12-inch-deep shelves unless noted otherwise, anachrome finish, 12-gauge steel.

2.12 MATERIALS

- A. Composite Wood Products: Provide materials that comply with requirements of the Architectural Woodwork Standards for each type of interior architectural woodwork and quality grade specified unless otherwise indicated.
 - 1. Medium-Density Fiberboard (MDF): ANSI A208.2, Grade 130.
 - 2. Particleboard: ANSI A208.1, Grade M-2-Exterior Glue.
 - 3. Softwood Plywood: DOC PS 1, medium-density overlay.
 - 4. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
 - 5. Thermally Fused Laminate Panels: Particleboard or MDF 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.
- B. High-Pressure Decorative Laminate (Plastic Laminate): NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.
 - 1. Basis of Design: Subject to compliance with requirements, provide high-pressure decorative laminates as indicated on drawings or comparable products by one of the following:
 - a. Formica Corporation.
 - b. Nevamar; a Panolam Industries International, Inc. brand.
 - c. Wilsonart LLC.
- C. Pinboard Linoleum Tack Surface (TS): Uni-colored linoleum, self-healing.
 - 1. Basis of Design: Forbo Bulletin Board.
 - 2. Color: As indicated on drawings.
 - 3. Adhesive: As provided by manufacturer or product that complies with requirements by the manufacturer.
 - 4. Backing/Substrate:

- a. Adhere directly to clean, finished surface.
 - b. ¼" hardboard when built into casework or as indicated on drawings.
5. Installation: Comply with manufacturer installation instructions.

2.13 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Nailers: Softwood or hardwood lumber kiln-dried to less than 15 percent moisture content.
- B. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage.
 1. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
 2. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- D. Installation Adhesive: Product recommended by fabricator for each substrate for secure anchorage.

2.14 FABRICATION

- A. Fabricate interior architectural woodwork to dimensions, profiles, and details indicated.
 1. Ease edges to radius indicated for the following:
 - a. Edges of Solid-Wood (Lumber) Members: 1/16 inch unless otherwise indicated.
 - b. Edges of Rails and Similar Members More Than 3/4-inch-thick: 1/8 inch,
- B. Fabricate countertops to dimensions, profiles, and details indicated. Provide front and end overhang of 1 inch over base cabinets unless shown otherwise.
- C. Complete fabrication, including assembly, to maximum extent possible before shipment to Project site.
 1. Disassemble components only as necessary for shipment and installation.
 2. Where necessary for fitting at site, provide allowance for scribing, trimming, and fitting.
 - a. Any exposed area of the casework toe-kick space or side panels, not covered by resilient wall base or other flooring wall base material, must have matching plastic laminate or wood veneer finish applied.
 3. Notify Architect seven days in advance of the dates and times interior architectural woodwork fabrication will be complete.
 4. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled.
 - a. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting.
 - b. Verify that parts fit as intended, and check measurements of assemblies against field measurements indicated on approved Shop Drawings before disassembling for shipment.

- D. Shop-cut openings in cabinets and countertops 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.
 - 1. Seal edges of cutout openings by saturating with varnish.
 - 2. Owner shall locate grommets in field after casework is fully completed. Provide cutout and install grommets as directed by Owner.
 - a. Provide one grommet per workspace.
- E. Install glass to comply with applicable requirements in Section 088000 "Glazing" and in GANA's "Glazing Manual."
 - 1. For glass in wood frames, secure glass with removable stops.
 - 2. For exposed glass edges, polish and grind smooth.

2.15 SHOP PRIMING

- A. Preparations for Finishing: Comply with the Architectural Woodwork Standards for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing interior architectural woodwork, as applicable to each unit of work.
- B. Interior Architectural Woodwork for Opaque Finish: Shop prime with one coat of wood primer
 - 1. Backpriming: Apply one coat of primer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.
- C. Interior Architectural Woodwork for Transparent Finish: Shop-seal concealed surfaces with required pretreatments and first coat of finish as specified in Section 099123 "Interior Painting."
 - 1. Backpriming: Apply one coat of sealer, compatible with finish coats, to concealed surfaces of woodwork. Apply two coats to surfaces installed in contact with concrete or masonry and to end-grain surfaces.
- D. Concealed surfaces of plastic-laminate-clad woodwork do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative panels.

2.16 SHOP FINISHING

- A. Finish interior architectural woodwork, as specified in this section, at fabrication shop. Defer only final touchup, cleaning, and polishing until after installation.
- B. Transparent Finish:
 - 1. Architectural Woodwork Standards Grade: Custom
 - 2. Finish: System - 11, Polyurethane, Catalyzed.
 - 3. Staining: Match Architect's sample.
 - 4. Sheen: Satin, 31-45 gloss units measured on 60-degree gloss meter according to ASTM D523.
- C. Opaque Finish:

1. As specified in Section 099123 "Interior Painting."

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition interior architectural woodwork to humidity conditions in installation areas for not less than 72 hours prior to beginning of installation.
- B. Before installing interior architectural woodwork, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming of concealed surfaces.

3.2 INSTALLATION GENERAL

- A. Architectural Woodwork Standards Grade: Install interior architectural woodwork to comply with same grade as item to be installed.
- B. Assemble interior architectural woodwork and complete fabrication at Project site to the extent that it was not completed during shop fabrication.
- C. Install interior architectural woodwork level, plumb, true in line, and without distortion.
 1. Shim as required with concealed shims.
 2. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
- D. Scribe and cut interior architectural woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor interior architectural woodwork to anchors or blocking built in or directly attached to substrates.
 1. Secure with countersunk, concealed fasteners and blind nailing.
 2. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with interior architectural woodwork.
 3. For shop-finished items, use filler matching finish of items being installed.

3.3 CABINET INSTALLATION

- A. Install cabinets level, plumb, and true in line to a tolerance of 1/8 inch in 96 inches using concealed shims.
 1. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
 2. Install cabinets without distortion so doors and drawers are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items. Allow for final adjustment after installation.
 3. Maintain veneer sequence matching of cabinets with transparent finish.
 4. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with the following:

- a. No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.
 - b. No. 10 wafer-head sheet metal screws through metal backing or metal framing behind wall finish.
5. Provide closure at horizontal gaps at filler panels and any other locations where voids or gaps occur. Use panel materials or wood blocking. Match adjacent exposed material finish.
 6. Adjust operating hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

3.4 PLASTIC-LAMINATE-CLAD COUNTERTOP INSTALLATION

- A. Assemble countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
 1. Provide cutouts for appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
 2. Seal edges of cutouts by saturating with varnish.
- B. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
 1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten according to manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- C. Scribe and cut countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- D. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
 1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
 2. Secure backsplashes to walls with adhesive.
 3. Seal joints between countertop and backsplash, if any, and joints where countertop and backsplash abut walls with mildew-resistant silicone sealant or another permanently elastic sealing compound recommended by countertop material manufacturer.
 - a. Comply with Section 099200 "Joint Sealants".

3.5 SOLID SURFACE COUNTERTOP INSTALLATION

- A. Install countertops level to a tolerance of 1/8 inch in 8 feet, 1/4 inch maximum. Do not exceed 1/64-inch difference between planes of adjacent units.
- B. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Predrill holes for screws as recommended by manufacturer. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

- C. Fasten subtops to cabinets by screwing through subtops into cornerblocks of base cabinets. Shim as needed to align subtops in a level plane.
- D. Secure countertops to subtops with adhesive according to solid surface material manufacturer's written instructions. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
- E. Bond joints with adhesive and draw tight as countertops are set. Mask areas of countertops adjacent to joints to prevent adhesive smears.
 - 1. Install metal splines in kerfs in countertop edges at joints. Fill kerfs with adhesive before inserting splines and remove excess immediately after adjoining units are drawn into position.
 - 2. Clamp units to temporary bracing, supports, or each other to ensure that countertops are properly aligned and joints are of specified width.
- F. Install backsplashes and end splashes by adhering to wall and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears.
- G. Install aprons to backing and countertops with adhesive. Mask areas of countertops and splashes adjacent to joints to prevent adhesive smears. Fasten by screwing through backing. Pre-drill holes for screws as recommended by manufacturer.
- H. Complete cutouts not finished in shop. Mask areas of countertops adjacent to cutouts to prevent damage while cutting. Make cutouts to accurately fit items to be installed, and at right angles to finished surfaces unless beveling is required for clearance. Ease edges slightly to prevent snipping.
 - 1. Seal edges of cutouts in particleboard subtops by saturating with varnish.
- I. Apply sealant to gaps at walls; comply with Section 079200 "Joint Sealants."

3.6 WOOD COUNTERTOP INSTALLATION

- A. Grade: Install wood countertops to comply with same grade as item to be installed.
- B. Assemble wood countertops and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Field Jointing: Where possible, make in the same manner as shop jointing, using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop so Project-site processing of top and edge surfaces is not required. Locate field joints where shown on Shop Drawings.
 - 1. Secure field joints in countertops with concealed clamping devices located within 6 inches of front and back edges and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer's written instructions to exert a constant, heavy-clamping pressure at joints.
- D. Scribe and cut wood countertops to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Countertop Installation: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.

1. Install countertops level and true in line. Use concealed shims as required to maintain not more than a 1/8-inch-in-96-inches variation from a straight, level plane.
2. Secure backsplashes to walls with adhesive.
3. Seal joints between countertop and backsplash, and joints where countertop and backsplash abut walls with sealant specified in Section 079200 "Joint Sealants."

F. Shop Finishes: Touch up finishing after installation of wood countertops.

1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.

3.7 INTERIOR STANDING AND RUNNING TRIM INSTALLATION

A. Standing and Running Trim:

1. Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible.
2. Do not use pieces less than 36 inches long, except where shorter single-length pieces are necessary. Standard pieces are to be 96 inches.
3. Scarf running joints and stagger in adjacent and related members.
4. Cope or Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint.
5. Plane backs of casings to provide uniform thickness across joints where necessary for alignment.
6. Install trim after gypsum-board joint finishing operations are completed.
7. Install without splitting; drill pilot holes before fastening where necessary to prevent splitting.
8. Fasten to prevent movement or warping.
9. Countersink fastener heads on exposed carpentry work and fill holes.
10. Fill gaps, if any, between top of base and wall with plastic wood filler; sand smooth; and finish same as wood base if finished.
11. Fill gaps, if any, between top of base and wall with latex sealant, paint to match wall.
12. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

3.8 SHELVING AND CLOSET ROD INSTALLATION

A. Cut shelf cleats at ends of shelves about 1/2 inch less than width of shelves and sand exposed ends smooth.

1. Install shelf cleats by fastening to framing or backing with finish nails or trim screws, set below face and filled.
2. Space fasteners not more than 16 inches o.c. Use two fasteners at each framing member or fastener location for cleats 4 inches nominal in width and wider.
3. Apply a bead of multipurpose construction adhesive to back of shelf cleats before installing.
4. Remove adhesive that is squeezed out after fastening shelf cleats in place.

B. Cut shelves to neatly fit openings with only enough gap to allow shelves to be removed and reinstalled.

1. Install shelves, fully seated on cleats, brackets, and supports.
2. Fasten shelves to cleats with finish nails or trim screws, set flush.
3. Fasten shelves to brackets to comply with bracket manufacturer's written instructions.

C. Install rod flanges for closet rods as indicated.

1. Fasten to shelf cleats, framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.
 2. Install rods in rod flanges.
- D. Install standards for adjustable shelf brackets according to manufacturer's written instructions, spaced not more than 32 inches o.c. and within 6 inches of ends of shelves. Fasten to framing members, blocking, or metal backing, or use toggle bolts or hollow wall anchors.

3.9 REPAIR

- A. Repair damaged and defective interior architectural woodwork, where possible, to eliminate functional and visual defects and to result in interior architectural woodwork being in compliance with requirements of Architectural Woodwork Standards for the specified grade.
- B. Where not possible to repair, replace defective woodwork.
- C. Shop Finish: Touch up finishing work specified in this Section after installation of interior architectural woodwork.
1. Fill nail holes with matching filler where exposed.
 2. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are shop applied.
- D. Field Finish: See Section 099123 "Interior Painting" for final finishing of installed interior architectural woodwork not indicated to be shop finished.

3.10 CLEANING

- A. Clean interior architectural woodwork on exposed and semiexposed surfaces.

END OF SECTION

SECTION 064213

STACKED WOOD PANELING

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. Sliced wood of varying thickness assembled into panels for wall finish.
2. Wood furring, blocking, shims, and hanging strips for installing flush wood paneling that is not concealed within other construction.
3. Factory finish wood paneling.

- B. Related Requirements:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing paneling that is concealed within other construction before paneling installation.
2. Section 099123 "Interior Painting" for surface preparation and the application of transparent acrylic finish on wood substrates.

1.3 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that paneling can be installed as indicated.

1.4 REFERENCED STANDARDS

- A. Provide products that have been tested in accordance with ASTM E84, "Surface Burning Characteristics of Building Materials" meeting a minimum of Class C rating:

1. Flame Spread Index: 76-200.
2. Smoke Developed Index: 0-450.

- B. Preinstallation Conference: Conduct conference at Project site.

1.5 WARRANTY

- A. 5 - Year Limited Structural Warranty

1. Wood wall paneling shall be free from manufacturing defects for the period of 5 years from the date of Substantial Completion.

B. 3 - Year Surface Finish Warranty

1.6 SUBMITTALS

A. Product Data: For each type of product.

1. ASTM E84 test report.

B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

C. Shop Drawings: For stacked wood paneling.

1. Include elevations, details, and attachment.
2. Include installation instructions.
3. Show locations and sizes of furring or blocking, including concealed blocking specified in other Sections.
4. Paneling is produced from premanufactured sets: show finished panel sizes, set numbers, sequence numbers within sets, and method of cutting panels to produce indicated sizes.

D. Samples for Verification: For the following:

1. Lumber for Transparent Finish: Not less than 12 inches wide by 12 inches long for each species.

E. Warranty: provide standard form of warranty.

1.7 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. Shop Certification: AWI's Quality Certification Program accredited participant or WI's Certified Compliance Program licensee.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver paneling until painting and similar operations that might damage paneling have been completed in installation areas. Store paneling in installation areas or in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.9 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install paneling until building is enclosed, wet-work is complete, and HVAC system is operating and will maintain temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during the remainder of the construction period.

- B. Field Measurements: Where paneling is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
 - 1. Locate concealed framing, blocking, and reinforcements that support paneling by field measurements before being enclosed/concealed by construction and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where paneling is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

PART 2 - PRODUCTS

2.1 PANELING FABRICATOR

- A. Stacked Wood Walls, Inc., Website: <https://stackedwood.squarespace.com/>
 - 1. Distributed by: Fashion Architectural Designs, 4005 Carnegie Avenue, Cleveland, OH 44103. Tel: (800) 362-9930; Fax # (216) 432-0800
Email: customerservice@FashionADco.com

2.2 PANELING, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of flush wood paneling (wood-veneer wall surfacing) indicated for construction, finishes, installation, and other requirements.
 - 1. The Contract Documents contain requirements that are more stringent than the referenced woodwork quality standard. Comply with requirements of Contract Documents in addition to those of the referenced quality standard.

2.3 STACKED WOOD PANELING (DWP-1)

- A. Style: Refer to drawings.
- B. Finish: Unfinished.
- C. Species: Recycled Teak and FSC-Certified.
- D. Panel size: 22.5 by 19.5 inches by 8 inches high interlocking panels.
- E. Thickness: Varying from 1/4 to 7/8 inches.
- F. Corner / Edge Trims: Right angle molding.
- G. Assemble panels by gluing stacked wood in length combinations of a random appearance.

2.4 MATERIALS

- A. Materials, General: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
- B. Wood Moisture Content: 5 to 10 percent.
- C. Composite Wood Products: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
- D. Adhesive: Manufacturer's standard to attach paneling substrate to gypsum board faced wall partitions.

2.5 INSTALLATION MATERIALS

- A. Provide blocking installed concealed within wall framing: Fire-retardant-treated softwood 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. Use finish nail-sized screw heads for fastening paneling at locations that will remain exposed.
 - 1. Predrill hole locations to avoid splintering exposed hardwood.
 - 2. Provide wood-fill putty in screw holes to match finish of wood.
- C. Installation Adhesive: Low or zero-VOC product recommended by panel fabricator for each substrate for secure anchorage.

2.6 FABRICATION

- A. Sand wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Complete fabrication, including assembly, 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.
 - 1. Notify Architect seven days in advance of the dates and times paneling fabrication will be complete.

2.7 FACTORY PREFINISHING

- A. General: Cleaning and application of finish to be on project site after installation.
- B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing paneling, as applicable to each unit of work.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition paneling to humidity conditions in installation areas.

- B. Before installing paneling, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Grade: Install paneling to comply with quality standard grade of paneling to be installed.
- B. Install paneling level, plumb, true in line, and without distortion. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches, install with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
- C. Anchor paneling to supporting substrate with concealed fasteners and adhesive.
 - 1. Do not use face fastening unless covered by trim or if otherwise indicated.
- D. Field cut openings to receive 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.
- E. Provide corner trim at bottom and top edges, and both sides of walls to receive paneling.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective paneling, where possible, to eliminate defects. Where not possible to repair, replace paneling. Adjust for uniform appearance.
- B. Clean paneling on exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION

SECTION 066400
PLASTIC PANELING

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. Plastic sheet paneling.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For plastic paneling and trim accessories, in manufacturer's standard sizes.

1.4 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install plastic paneling until spaces are enclosed and weathertight and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide plastic panels by one of the following:
 - 1. Crane Composites, Inc.
 - 2. Glasteel.
 - 3. Marlite.
 - 4. Nudo Products, Inc.
- B. Source Limitations: Obtain plastic paneling and trim accessories from single manufacturer.

2.2 PLASTIC SHEET PANELING (FRP Panels)

- A. Glass-Fiber-Reinforced Plastic Paneling: Gelcoat-finished, glass-fiber-reinforced plastic panels complying with ASTM D5319. Panels shall be USDA accepted for incidental food contact.
 - 1. Surface-Burning Characteristics: As follows when tested by a qualified testing agency according to ASTM E84. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Nominal Thickness: Not less than 0.09 inch (3/32 inch).
 - 3. Surface Finish: Smooth.
 - 4. Color: White.
 - 5. Trim Accessories Type: Aluminum.

2.3 ACCESSORIES

- A. Trim Accessories (FRP Aluminum Trim): Manufacturer's standard one-piece aluminum extrusions designed to retain and cover edges of panels. Provide division bars, inside corners, outside corners, and caps as needed to conceal edges.
 - 1. Color/Finish: White.
- B. Adhesive: As recommended by plastic paneling manufacturer.
- C. Sealant: Mildew-resistant, single-component, neutral-curing or acid-curing silicone sealant recommended by plastic paneling manufacturer and complying with requirements in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove materials that might interfere with adhesive bond.
- B. Prepare substrate by sanding high spots and filling low spots as needed to provide flat, even surface for panel installation.
- C. Clean substrates of substances that could impair adhesive bond, including oil, grease, dirt, and dust.
- D. Condition panels by unpacking and placing in installation space before installation according to manufacturer's written recommendations.

- E. Lay out paneling before installing. Locate panel joints to provide equal panels at ends of walls not less than half the width of full panels.
 - 1. Mark plumb lines on substrate at trim accessory and panel joint locations for accurate installation.
 - 2. Locate trim accessories to allow clearance at panel edges according to manufacturer's written instructions.

3.3 INSTALLATION

- A. Install plastic paneling according to manufacturer's written instructions.
- B. Install panels in a full spread of adhesive.
- C. Install trim accessories with adhesive or fasteners approved by manufacturers. Do not fasten through panels.
- D. Fill grooves in trim accessories with sealant before installing panels, and bed inside corner trim in a bead of sealant.
- E. Maintain uniform space between panels and wall fixtures. Fill space with sealant.
- F. Maintain uniform space between adjacent panels and between panels and floors, ceilings, and fixtures. Fill space with sealant.
- G. Remove excess sealant and smears as paneling is installed. Clean with solvent recommended by sealant manufacturer and then wipe with clean dry cloths until no residue remains.

END OF SECTION

SECTION 071326

SELF-ADHERING SHEET WATERPROOFING

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. Modified bituminous sheet waterproofing.
 - 2. Molded sheet drainage panels.
 - 3. Insulation panels.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.4 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
 - 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
- D. Qualification Data: For Installer.
- E. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 - 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- B. Installer's Special Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of five years.
 - 1. Warranty includes removing and reinstalling drainage panels and insulation.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations for Waterproofing System: Obtain waterproofing materials and molded-sheet drainage panels from single source from single manufacturer.

2.2 MODIFIED BITUMINOUS SHEET WATERPROOFING (Self Adhering Sheet Waterproofing)

- A. Modified Bituminous Sheet: Minimum 60-mil nominal thickness, self-adhering sheet consisting of 56 mils of rubberized asphalt laminated on one side to a 4-mil-thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
 - b. GCP Applied Technologies, Inc., Bituthene 4000.
 - c. Henry Company; Blueskin WP200
 - d. W. R. Meadows, Inc., Mel-Rol.
 - 2. Physical Properties:

- a. Tensile Strength, Membrane: 250 psi minimum; ASTM D 412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F; ASTM D 1970.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch movement; ASTM C 836.
 - e. Puncture Resistance: 40 lbf minimum; ASTM E 154.
 - f. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F; ASTM D 570.
 - g. Water Vapor Permeance: 0.05 perms maximum; ASTM E 96, Water Method.
 - h. Hydrostatic-Head Resistance: 200 feet minimum; ASTM D 5385.
3. Sheet Strips: Self-adhering, rubberized-asphalt strips of same material and thickness as sheet waterproofing.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
 2. The auxiliary materials and products listed are intended to include the required components of the manufacturers systems. The items listed are not meant to be totally inclusive of all materials and products required for a complete installation.
 3. Manufacturer may recommend different auxiliary materials and products due to project or weather conditions such as prolonged UV exposure or low temperature installations. Manufacturers recommended products that differ from those listed shall be identified in product data submittal.
- B. Primer: Liquid waterborne primer recommended for substrate by sheet-waterproofing material manufacturer.
 1. CCW-702 or other approved primer by Carlisle Coatings & Waterproofing, Inc.
 2. Bituthene Adhesive Primer B2 by GCP Applied Technologies, Inc.
 3. Henry Company; Aquatac Primer.
 4. W. R. Meadows, Inc., Mel-Prime W/B.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.
 1. CCW-715 adhesive by Carlisle Coatings & Waterproofing, Inc.
 2. Bituthene System 4000 Surface Conditioner by GCP Applied Technologies, Inc.
 3. Henry Company; approved product.
 4. W. R. Meadows, Inc., approved product.
- D. Liquid Membrane: Elastomeric, one or two-component liquid, cold fluid applied, of trowel grade or low viscosity gun grade.
 1. CCW-703V Liqueiseal by Carlisle Coatings & Waterproofing, Inc.
 2. Bituthene Liquid Membrane by GCP Applied Technologies, Inc.
 3. Henry Company; Polybitume 570-05.
 4. W. R. Meadows, Inc., Mel-Rol Liquid Membrane.
- E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.

1. Approved product by waterproofing manufacturer.
- F. Waterstop: Synthetic waterstop strip that expands when contacted with water.
1. CCW MiraSTOP by Carlisle Coatings & Waterproofing, Inc.
 2. Adcor ES by GCP Applied Technologies, Inc.
 3. Henry Company; Synko Flex Waterstop.
 4. W. R. Meadows, Inc., Waterstop EC.
- G. Metal Termination Bars: Stainless steel bars, approximately 1 by 1/8-inch-thick, predrilled at maximum 9-inch centers.

2.4 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel with Polymeric Film: Composite subsurface drainage panel acceptable to waterproofing manufacturer consisting of a studded, nonbiodegradable, molded-plastic-sheet drainage core; with a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 sieve laminated to one side of the core and a polymeric film bonded to the other side; and with a vertical flow rate of 9 to 21 gpm per ft.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRAIN 6200.
 - b. Grace, W. R., & Co. - Conn.; Hydroduct 220.
 - c. Henry Company; Henry DB
 - d. W. R. Meadows, Inc., Mel Drain.

2.5 INSULATION PANELS

- A. Extruded polystyrene boards in this article are also called "XPS boards." Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.
- B. Extruded Polystyrene Board: ASTM C 578, Type IV, 25-psi minimum compressive strength; unfaced; fabricated with shiplap or channel edges.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. DiversiFoam Products.
 - b. Dow Chemical Company (The).
 - c. Owens Corning Insulating Systems LLC.

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 waterproofing.

1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.

B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.

C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.

D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.

E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.

1. Install sheet strips of width according to manufacturer's written instructions and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch.

F. Bridge and cover expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths according to manufacturer's written instructions.

1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.

1. Install membrane strips centered over vertical inside corners. Install 3/4-inch fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
 - b. At horizontal-deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.

H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 MODIFIED BITUMINOUS SHEET-WATERPROOFING APPLICATION

A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.

- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F, install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F.
- D. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.
- E. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- F. Seal edges of sheet-waterproofing terminations with mastic.
- G. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.
- H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches beyond repaired areas in all directions.

3.4 MOLDED-SHEET DRAINAGE-PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives or other methods that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction.

3.5 INSULATION PANEL INSTALLATION

- A. Install board insulation over molded sheet drainage panels and waterproofed surfaces. Cut and fit to within 3/4 inch of projections and penetrations.
- B. On vertical surfaces, set insulation units in adhesive or tape applied according to manufacturer's written instructions.
- C. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.6 PROTECTION, REPAIR, AND CLEANING

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Protect installed board insulation and insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

- C. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- D. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 072100

THERMAL 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:

1. Extruded polystyrene foam-plastic board.
2. Mineral-wool board.
3. Glass-fiber blanket.
4. Mineral-wool blanket.
5. Spray applied foamed insulation.

- B. Related Requirements:

1. Section 042000 "Unit Masonry" for insulation, specified in this section, installed in masonry cavity wall construction.
2. Section 071326 "Self-Adhering Sheet Waterproofing" for insulation panels installed with waterproofing system.
3. Section 075323 "Ethylene-Propylene-Diene-Monomer (EPDM) Roofing" for insulation specified as part of roofing construction.
4. Section 092900 "Gypsum Board" for sound attenuation blanket used as acoustic insulation.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to 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.
- B. Protect foam-plastic board insulation as follows:
 1. Do not expose to sunlight except to necessary extent for period of installation and concealment.

2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation time.
3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD (Rigid Insulation - under slab-on-grade, at foundation walls and base of grouted masonry walls)

- A. Extruded polystyrene boards in this article are also called "XPS boards." Roman numeral designators in ASTM C578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.
- B. Extruded Polystyrene Board, Type IV: ASTM C578, Type IV, 25-psi minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E84.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 - a. DiversiFoam Products.
 - b. Dow Chemical Company.
 - c. Owens Corning.

2.2 MINERAL-WOOL BOARD (Continuous Insulation - Mineral Wool Board)

- A. Mineral-Wool Board, Types IVA and IVB, Unfaced: ASTM C612, Types IVA and IVB; with maximum flame-spread and smoke-developed indexes of zero and zero, respectively, per ASTM E84; passing ASTM E136 for combustion characteristics. Nominal density of 6 lb/cu. ft.
 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. Thermafiber RainBarrier HD, Owens Corning.
 - b. Rockwool Cavityrock, Roxul Inc.
 2. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - a. The combination of selected mineral-wool board cavity insulation and selected fluid-applied membrane air and water resistive barriers (see related Section 072726) must be listed together within a compliant NFPA 285 report.

2.3 GLASS-FIBER BLANKET (Glass-Fiber Batt Insulation)

- A. Glass-Fiber Blanket, Unfaced: ASTM C665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84; passing ASTM E136 for combustion characteristics.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 - a. CertainTeed Corporation.

- b. John Manville; a Berkshire Hathaway company.
- c. Knauf Insulation.
- d. Owens Corning.

2.4 MINERAL-WOOL BLANKETS (Mineral-Wool Batt Insulation)

- A. Mineral-Wool Blanket, Unfaced: ASTM C665, Type I (blankets without membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E84; passing ASTM E136 for combustion characteristics.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.
 - a. Industrial Insulation Group, LLC (IIG-LLC).
 - b. Roxul Inc.
 - c. Thermafiber, Inc.; an Owens Corning company.

2.5 SPRAYED APPLIED POLYURETHANE FOAM INSULATION (Spray Foam Insulation)

- A. Products: Subject to compliance with requirements, provide one of the products specified.
 - 1. Energy Efficient Solutions – Quick Cure Kit.
 - 2. Tiger Foam Insulation – Slow Rise.
 - 3. CertainTeed – Certa-Spray.
- B. Insulation for Miscellaneous Voids and where shown:
 - 1. Two component, closed cell, spray applied expanding polyurethane foam insulation, ASTM C1029.
 - 2. R-Value: R6 minimum per inch.
 - 3. Flame Spread Index: Less than 25 per ASTM E84.
 - 4. Smoke Developed Index: Less than 450 per ASTM E84.
 - 5. Density: 1.75 pounds per cubic foot.

2.6 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.
 - 1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Eckel Industries of Canada; Stic-Klip Type N Fasteners.
 - c. Gemco; Spindle Type.
 - 2. Plate: Perforated, galvanized carbon-steel sheet, 0.030 inch thick by 2 inches square.
 - 3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.
- B. Adhesively Attached, Angle-Shaped, Spindle-Type Anchors: Angle welded to projecting spindle; capable of holding insulation of specified thickness securely in position with self-locking washer in place.

1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. Gemco; 90-Degree Insulation Hangers.
 2. Angle: Formed from 0.030-inch- thick, perforated, galvanized carbon-steel sheet with each leg 2 inches square.
 3. Spindle: Copper-coated, low-carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation.
- C. Insulation-Retaining Washers: Self-locking washers formed from 0.016-inch- thick galvanized-steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 1-1/2 inches square or in diameter.
1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. AGM Industries, Inc.; RC150.
 - b. AGM Industries, Inc.; SC150.
 - c. Gemco; Dome-Cap.
 - d. Gemco; R-150.
 - e. Gemco; S-150.
 2. Protect ends with capped self-locking washers incorporating a spring steel insert to ensure permanent retention of cap in the following locations:
 - a. Crawl spaces.
 - b. Ceiling plenums.
 - c. Attic spaces.
 - d. Where indicated.
- D. Insulation Standoff: Spacer fabricated from galvanized mild-steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch [2 inches] [3 inches] between face of insulation and substrate to which anchor is attached.
1. Provided by Spindle-Type Anchor manufacturer.
- E. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates without damaging insulation, fasteners, or substrates.
1. Products: Subject to compliance with requirements, provide one of the products specified.
 - a. AGM Industries, Inc.; TACTOO Adhesive.
 - b. Eckel Industries of Canada; Stic-Klip Type S Adhesive.
 - c. Gemco; Tuff Bond Hanger Adhesive.

2.7 ACCESSORIES

- A. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

3.3 INSTALLATION OF SLAB RIGID INSULATION

- A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches below exterior grade line.
- B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
 - 1. If not otherwise indicated, extend insulation a minimum of 24 inches in from exterior walls.

3.4 INSTALLATION OF EXTERIOR WALL CONTINUOUS INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Install continuous insulation behind exterior cladding systems including composite metal panels.
- C. Mineral-Wool Board Insulation: Install with closely fitting joints in both directions. Fit courses of insulation between obstructions, with edges butted tightly. Retain units firmly against sheathing substrates by using cladding support system attachment method according to manufacturer's written instructions. Use spindle type impaling pin anchor attachment method in addition to cladding support system where required.

3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

- A. Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 - 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
 - 3. Maintain 3-inch clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
 - 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:
 - 1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft.
 - 2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.6 INSTALLATION OF VAPOR RETARDERS ON FRAMING

- A. Place vapor retarders on side of construction indicated on Drawings.
- B. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives, vapor retarder fasteners, or other anchorage system as recommended by manufacturer. Extend vapor retarders to cover miscellaneous voids in insulated substrates, including those filled with loose-fiber insulation.
- C. Seal vertical joints in vapor retarders over framing by lapping no fewer than two studs and sealing with vapor-retarder tape according to vapor-retarder manufacturer's written instructions. Locate all joints over framing members or other solid substrates.
- D. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- E. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

3.7 INSTALLATION OF SPRAY APPLIED FOAM INSULATION

- A. Spray-Applied Polyurethane Foam Insulation: Apply spray-applied insulation according to manufacturer's written instructions at indicated areas. Apply insulation at penetrations of pipes, ducts and conduits in walls and window and door openings and other areas indicated. After insulation is applied, make flush with face of substrate by using method recommended by insulation manufacturer.

3.8 PROTECTION

- A. Protect installed insulation 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

SECTION 072119

FOAMED-IN-PLACE INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Closed-cell spray polyurethane foam insulation.
2. Accessories.

B. Related Requirements:

1. Section 072100 "Thermal Insulation" for mineral wool board, exterior wall continuous insulation.

1.2 SUBMITTALS

A. Product Data:

1. Closed-cell spray polyurethane foam insulation.
2. Accessories.

B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

C. Product Test Reports: For each product, for tests performed by qualified testing agency.

D. Qualification Statements: For Installer.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM INSULATION

A. Closed-Cell Spray Polyurethane Foam: ASTM C1029, Type II, minimum density of 2.0 lb/cu. ft. and minimum aged R-value at 1-inch thickness of 6.5 deg F x h x sq. ft./Btu at 75 deg F.

1. Manufacturers: Subject to compliance with requirements provide one of the following products:
 - a. BASF Corporation; WALLTITE US.
 - b. Carlisle; SealTite PRO Closed Cell.

- c. Henry; PERMAX 2.0
 - d. Icynene Inc.; MD-C-200.
2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

2.2 ACCESSORIES

- A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.
- B. Membrane at Transitions in Substrate and Connections to Adjacent Elements: One of the following as acceptable to the spray polyurethane foam air barrier manufacturer:
 - 1. CCW-705 TWF by Carlisle Coatings and Waterproofing.
 - 2. Blueskin SA, Blueskin SA LT by Henry.
 - 3. ExoAir 110 by Tremco, Inc.
 - 4. Air Shield by W. R. Meadows, Inc.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.
- B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.
- C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.
- D. Framed Construction: Install into cavities formed by framing members to achieve thickness indicated on Drawings.
- E. Cavity Walls: Install into cavities to thickness indicated on Drawings.
- F. Miscellaneous Voids: Apply according to manufacturer's written instructions.

3.3 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION

SECTION 072726

FLUID-APPLIED MEMBRANE AIR AND WATER-RESISTIVE BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Fluid-applied membrane air and water resistive barrier assembly.
 - 2. Self-adhering high temperature underlayment.

1.3 DEFINITIONS

- A. Air and Water Resistive Barrier Material: A primary element that provides a continuous barrier to the movement of air.
- B. Air and Water Resistive Barrier Accessory: A transitional component of the air barrier that provides continuity.
- C. Air Barrier and Water Resistive Assembly: A functional fluid-applied water-resistant barrier (WRB) applied to the exterior sheathing surfaces, exterior wall sheathing on cold formed metal framing construction of this building project. WRB is to be air impermeable, vapor impermeable, flexible and UV resistant.

1.4 PERFORMANCE REQUIREMENTS

- A. Assembly Performance: Provide a continuous air barrier in the form of an assembly that has an air leakage not to exceed 0.04 cubic feet per minute per square foot under a pressure differential of 1.57 pounds per square foot (0.04 cfm/ft² @ 1.57 psf) when tested in accordance with ASTM E2357. The assembly shall accommodate movements of building materials by providing expansion and control joints as required. Expansion / control joints, changes in substrate and perimeter conditions shall have appropriate accessory materials at such locations.
 - 1. The air barrier assembly shall be capable of withstanding combined design wind, fan and stack pressures, both positive and negative on the envelope without damage or displacement and shall transfer the load to the structure.
 - 2. Fluid applied air barriers shall not displace adjacent materials in the air barrier assembly under full load.
 - 3. The air barrier assembly shall be joined in an airtight and flexible manner to the materials of adjacent assemblies, allowing for the relative movement of assemblies due to thermal and moisture variations, creep, and anticipated seismic movement.

- B. Connections to Adjacent Materials: Provide connections to prevent air leakage at the following locations:
 - 1. Foundation and walls, including penetrations, ties and anchors.
 - 2. Walls, windows, curtain walls, storefronts, louvers, doors, and all other fenestration.
 - 3. Different assemblies and fixed openings within those assemblies.
 - 4. Wall and roof connections.
 - 5. Floors over unconditioned space.
 - 6. Walls, floor and roof across construction, control and expansion joints.
 - 7. Walls, floors and roof to utility, pipe and duct penetrations.
 - 8. Seismic and expansion joints.
 - 9. All other potential air leakage pathways in the building envelope.

- C. Fire Test for Exterior Walls: Fluid applied membrane air and water resistive barriers specified in this section are to be part of exterior wall systems that comply with NFPA 285 – Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.
 - 1. Air barrier system as a component of a wall assembly shall have been tested and passed NFPA 285. Project specific wall assemblies must utilize air barrier manufacturer/product approved and listed in fire testing criteria.

1.5 SUBMITTALS

- A. Product Data: For each type of product, include manufacturer's written instructions for evaluating, preparing, and treating substrate; temperature and other limitations of installation conditions, technical data; dry film thickness and tested physical and performance properties of air barrier.

- B. Shop Drawings: For air-barrier assemblies.
 - 1. Show locations and extent of air barrier materials, accessories, and assemblies specific to Project conditions.
 - 2. Include details for substrate joints and cracks, counterflashing, transition strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 3. Include details of interfaces with other materials that form part of air barrier.

- C. Qualification Data: For Installer. Include list of ABAA-certified installers and supervisors employed by Installer, who work on Project.

- D. Product Certificates: Submit letter from air barrier manufacturer, certifying compatibility of air barrier and accessory materials with Project materials that connect to or that come in contact with the barrier; signed by product manufacturer.

1.6 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm experienced in applying air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

- B. Single-Source Responsibility: Obtain primary air barrier materials and air-barrier accessories from a single manufacturer.

- C. Preinstallation Conference: Conduct conference at Project site.
 - 1. Include installers of other construction connecting to air barrier, including roofing, waterproofing, architectural precast concrete, masonry, sealants, windows, glazed curtain walls, and door frames.
 - 2. Review air barrier requirements including surface preparation, substrate condition and pretreatment, minimum substrate curing period, temperature application limitations, forecasted weather conditions, special details and sheet flashings, mockups, installation procedures, sequence of installation, testing and inspecting procedures, and protection and repairs.
- D. Mockups: Construct mockups to set quality standards for materials and execution, and for testing when applicable.
 - 1. Non – Integrated (Free Standing) Mockup: Refer to Division 1 Section “Mockups” for non-integrated mockup construction.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original packages with seals unbroken, labeled with material Manufacturer's name, product, date of manufacture, and directions for storage.
 - 1. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- B. Store materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by material manufacturer. Protect stored materials from direct sunlight and other sources of ultra-violet light.
- C. Handle materials in accordance with material manufacturer's recommendations.

1.8 PROJECT 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 performance of air barrier.
 - 2. Do not apply air barrier to a damp or wet substrate or during snow, rain, fog, or mist.

1.9 COORDINATION / SEQUENCING

- A. Provide coordination with other Contractors and sequence the construction to ensure continuity of the air barrier system joints, junctures and transitions between materials and assemblies of materials and products, from substructure to walls to roof.

PART 2 - PRODUCTS

2.1 FLUID-APPLIED MEMBRANE AIR AND WATER RESISTIVE BARRIER (FAMAB)

- A. High Build, Vapor-Retarding Membrane Air and Water Resistive Barrier (Synthetic Polymer Type): Provide Manufacturer's complete system, compatible with adjacent components specified in other Sections.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle Coatings and Waterproofing: Fire Resist Barritech NP-LT.
 - b. Henry Company; Air-Bloc 16 MR.
 - c. Tremco Incorporated; ExoAir 130.
 - d. W. R. Meadows, Inc.: Air – Shield LSR.
 2. Physical and Performance Properties:
 - a. Membrane Air Permeance: Not to exceed 0.004 cfm/ sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
 - b. Membrane Vapor Permeance: Maximum 0.1 perms; ASTM E 96, Desiccant Method.
 - c. Ultimate Elongation: Minimum 500 percent; ASTM D412, Die C.
 - d. Adhesion to Substrate: 16 lbf/sq. in. when testing according to ASTM D 4541.
 - e. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - f. UV Resistance: Can be exposed to sunlight for 120 days according to manufacturer's written instructions.

2.2 FAMAB 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. Primer: Liquid primer recommended for substrate by manufacturer of air barrier material, and meeting LEED requirements if applicable.
- C. FAMAB Flashing/Transition Strips: Modified bituminous, 30-mil thick (minimum), smooth surfaced, self-adhering; rubberized asphalt sheet laminated to a 4-mil thick polyethylene film with release liner backer, meeting NFPA 285 requirements.
- D. FAMAB Reinforcing Fabric Strips: Air barrier manufacturer's glass-fiber-mesh tape.
- E. FAMAB Liquid Flashing/Detail Sealants: Air barrier manufacturer's recommended product.
- F. FAMAB Joint Filler: Air barrier manufacturer's standard trowel-grade substrate filler.
- G. FAMAB Foam Sealant: One or two component, foamed-in-place, polyurethane foam sealant, 1.5 to 2.0 lb/cu. ft. density; flame spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
- H. Stainless-Steel Sheet/Plate: ASTM A 240A/A240M, Type 304.
1. Flashing: 0.046-inch-thick (18 gage), and Series 300 stainless-steel fasteners typical.

2. Support Angles: 0.105-inch-thick (12 gage), and Series 300 stainless-steel expansion or chemical anchors at window opening sills and where shown.
- I. Sealant: ASTM C 920, single-component, neutral-curing silicone.
 1. Provide products recommended and approved by air barrier manufacturer which are compatible with adjacent materials.
 - J. Termination Mastic: Air barrier manufacturer's standard cold fluid applied elastomeric liquid; trowel grade.
- 2.3 SELF-ADHERING HIGH TEMPERATURE UNDERLAYMENT
- A. Self-Adhering Weather Barrier: 40 mil thick, self-adhering sheet consisting of 36 mils of rubberized asphalt laminated to a 4-mil thick, cross laminated polyethylene film with release liner on adhesive side. Provide primer when recommended by underlayment manufacturer.
 1. Thermal Stability: ASTM D 1970; stable after testing to 240 degrees F.
 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 degrees F.
 3. Products: Subject to compliance with requirements, provide one of the following:
 - a. Henry Company; Blueskin PE200HT
 - b. Carlisle Coatings & Waterproofing; WIP 300HT.
 - B. Accessories: Provide primers and all other accessories as recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
 3. Verify that concrete is visibly dry and free of moisture.
 4. Verify that masonry joints are flush and completely filled with mortar.
 5. Verify that mortar has been removed from anchors.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, and seal substrate and joints and cracks in 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. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate-patching material.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. 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.
- G. 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.
- H. Bridge isolation joints, expansion joints and discontinuous wall-to-wall, deck-to-wall, and deck-to-deck joints with air-barrier accessory material that accommodates joint movement according to manufacturer's written instructions and details.

3.3 ACCESSORIES INSTALLATION

- A. General: Install 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.
 - 2. Install transition strip on roofing membrane or base flashing so that a minimum of 3 inches of coverage is achieved over each substrate.
 - 3. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 - 4. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
- B. Connect and seal exterior wall air barrier membrane continuously to roofing membrane air barrier, concrete below-grade structures, floor-to floor construction, exterior glazing and window systems, glazed curtain-wall systems, storefront systems, exterior louvers, exterior door framing, and other construction used in exterior wall openings, using accessory materials as indicated.
 - 1. Wall to Foundation Transition: Utilize transition membrane at interface from wall to foundation.
 - 2. Parapets: Utilize transition membrane and extend over entire exposed surface parapet material, including top, both front and back and underside of cantilevered portion. Intent is to prevent infiltration of moisture into the parapet/wall system during construction.
 - 3. Dissimilar Materials: Utilize transition membrane per manufacturer's written instructions.
- C. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- D. Apply joint sealants or liquid flashing forming part of air barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant or liquid flashing cannot be applied within these temperature ranges.
- E. Glass Mat Gypsum Sheathing, install materials per manufacturer's instructions and per the following minimum requirements:

1. Corners: Provide reinforcing fabric strips with liquid flashing or joint filler at all corners.
 2. Joints: Provide reinforcing fabric strips with liquid flashing or joint filler at all joints.
 3. Fasteners: Treat all fasteners with joint filler or liquid flashing material.
- F. Wall Openings: Prime concealed perimeter frame surfaces of windows, curtain walls, storefronts, doors and stainless steel flashing/supports. Apply transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames, with not less than 1 inch of full contact.
1. Transition Strip: Roll firmly to enhance adhesion.
- G. Transitions to Structural Framing: 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. Utilize transition strip for continuity and seal edges with termination mastic.
- H. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air barrier membrane with foam sealant and cap with sealant joint.
- I. Seal exposed edges of transitions strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
1. Provide shingled application of air barrier membrane material over masonry flashing termination bars installed over initial membrane air barrier application.
- J. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fish mouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.4 PRIMARY AIR AND WATER RESISTIVE BARRIER MATERIAL INSTALLATION

- A. Apply air-barrier material to form a seal with strips and transition strips and to achieve a continuous air barrier according to air-barrier manufacturer's written instructions and details. Apply air-barrier material within manufacturer's recommended application temperature ranges. If required, provide manufacturers recommended additives to achieve lower temperature ranges.
1. Unless manufacturer recommends in writing against priming, apply primer to substrates at required rate and allow it to dry.
 2. Limit priming to areas that will be covered by air-barrier material on same day. Reprime areas exposed for more than 24 hours.
 3. Where multiple prime coats are needed to achieve required bond, allow adequate drying time between coats.
- B. High-Build Air and Water Resistive Barriers: Apply continuous unbroken air-barrier material to substrates according to the following thickness. Apply air-barrier material in full contact around protrusions such as masonry ties.
1. Vapor-Retarding, High-Build Air and Water Resistive Barrier: Total dry film thickness as recommended in writing by manufacturer to comply with performance requirements, but not less than 40 mils applied in one or more equal coats.
 - a. Verify thickness at square foot intervals.

- C. If Owner has engaged a testing agency, do not cover air barrier until it has been tested, and inspected by Owner's testing agency.
- D. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air barrier components.

3.5 SELF ADHERING HIGH TEMPERATURE UNDERLAYMENT INSTALLATION

- A. General: Install modified bituminous sheets and accessory materials according to manufacturer's written instructions.
 - 1. Prime substrates as recommended by manufacturer.
 - 2. Lap seams and junctures with other materials at least 4 inches except that at flashing flanges of other construction, laps need not exceed flange width.
 - 3. Lap self-adhering weather barrier over water-resistive barrier at bottom and sides of openings.
 - 4. Lap water-resistive barrier over flashing at heads of openings.
 - 5. After self-adhering weather barrier has been applied, roll surfaces with a hard rubber or metal roller to ensure that self-adhering weather barrier is completely adhered to substrates.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections and prepare test reports. When applicable; notify Owner's testing agency in writing of schedule for Work of this Section to allow sufficient time for testing and inspection. Do not cover Work of this Section until testing and inspection is complete.
- B. Inspections: Air barrier materials and installation are subject to inspection for compliance with requirements. Inspections may include the following:
 - 1. Continuity of air barrier system has been achieved throughout the building envelope with no gaps or holes.
 - 2. Air-barrier dry film thickness.
 - 3. Continuous structural support of air barrier system has been provided.
 - 4. Site conditions for application temperature and dryness of substrates have been maintained.
 - 5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 - 6. Surfaces have been primed, if applicable.
 - 7. Laps in strips and transition strips have complied with minimum requirements and have been shingled in the correct direction (or mastic has been applied on exposed edges), with no fishmouths.
 - 8. Termination mastic has been applied on cut edges.
 - 9. Strips and transition strips have been firmly adhered to substrate.
 - 10. Compatible materials have been used.
 - 11. Transitions at changes in direction and structural support at gaps have been provided.
 - 12. Connections between assemblies (membrane and sealants) have complied with requirements for cleanliness, preparation and priming of surfaces, structural support, integrity, and continuity of seal.
 - 13. All penetrations have been sealed.
- C. Tests: Testing to be performed will be determined by Owner's testing agency:
- D. Remove and replace deficient air barrier components and retest as required.

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. Remove and replace air barrier exposed for more than manufacturer's allowable limit.
 - 2. Protect air barrier from contact with creosote, uncured coal-tar products, TPO, EPDM, flexible PVC membranes, 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

SECTION 074213.13

FORMED METAL WALL PANELS

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. Backlit perforated metal panel assembly.
- 2. Cladding support system.

- B. Related Sections:

- 1. Section 074213.23 "Metal Composite Material Wall Panels" for metal-faced composite wall panels.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Meet with Owner, Architect, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels.
- 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- 3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
- 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
- 5. Review flashings, details, wall penetrations, and condition of other construction that affect metal panels.
- 6. Review temporary protection requirements for metal panel assembly during and after installation.
- 7. Review of procedures for repair of metal panels damaged after installation.
- 8. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 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. Sustainable Design (LEED) Submittals: Refer to Section 018113 and comply with requirements when applicable.
- C. Shop Drawings:
 - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
 - a. Include information on metal plate system, cladding support system, profile types, sizes, gages, spacing and any other required information for system installation.
 - b. Include information for fasteners; sizes, spacing and any other required information for system installation.
 - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 3 inches per 12 inches (2.5:10).
- D. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:
 - 1. Metal Panels: 12 by 12 inches.
- E. Delegated-Design Submittal: Engineering analysis for Formed Metal Wall Panel assembly and cladding support system design. Formed Metal Wall Panel assembly to be coordinated with Cold-Formed Metal Framing systems and exterior sheathing that they are fastened to and supported by.
 - 1. Comply with performance requirements and design criteria, including analysis data signed and sealed by a qualified professional engineer responsible for their preparation.
 - 2. Provide comprehensive structural design analysis, signed/sealed by Delegated Design Engineer.
- F. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal 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 panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water.

Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.

- D. Retain strippable protective covering on metal panels during installation.

1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design Formed Metal Wall Panel System.
 - 1. Formed Metal Wall Panel System Delegated Design includes coordination and integration with the following systems:
 - a. Formed Metal Wall Panels.
 - b. Metal panel support brackets.
 - c. This sections Cladding Support System.
 - 2. Formed Metal Wall Panel Delegated Design is to include anchorage of it to Cold-Formed Metal Framing or other structural system.
 - a. Cold-Formed Metal Framing Delegated Design submittal is to be obtained by (provided to) the Wall Panel Manufacturer's Delegated Design Engineer.

- B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E1592:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Other Design Loads: As indicated on Drawings.
 - 3. Deflection Limits: For wind loads, no greater than 1/180 of the span.
- C. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 1.57 lbf/sq. ft.
- D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- F. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 CONCEALED-FASTENER, BACKLIT PERFORATED METAL WALL PANELS

- A. Provide factory-formed metal panels designed to be field assembled by interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners. Include accessories required for weathertight installation.
- B. Backlit Perforated Metal Wall Panels: Formed panels with flat, laser cut perforated face.
 - 1. Product: Subject to compliance with requirements, provide the following:
 - a. Laser Cut Aluminum "Moz Metals" by Moz Designs, Inc.
 - 2. Aluminum Sheet: Coil-coated sheet, ASTM B209 alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - a. Nominal Thickness: 0.188 inch (3/16 inch).
 - b. Exterior Finish: Manufacturers standard powder coat finish.
 - c. Color: Dark Grey Metallic.
 - 3. Panel Type: Manufacturers "Key-Slot Wall Panels".
 - a. Panels have formed edges with flat face that has laser cut perforations.

4. Perforation Pattern: Skyline Pattern.
 - a. Open Area: 10%.
 - b. Largest Opening: 1.34" x 1.34".
 - c. Border Width (no perforations): 1.80".
5. Panel Coverage: 48 inches wide by 96 inches high, see drawings for required custom sizes.
6. Panel Height: 6 inch total depth when attached to mounting bracket.

C. Direct Backlighting Components

1. Light Diffusing Acrylic Panel.
 - a. White translucent Acrylic #2447, matte surface finish.
 - b. 1/8" thick.
 - c. Light transmission: 50%.
2. LED Lighting System.
 - a. Manufacturers "LED strip lights with drivers".
 - b. Strip lights laminated to aluminum bars.
 - 1) Strips 3/8" wide by 1/8" high.
 - c. 24 V Drivers.
 - d. 120 degree beam spread of light.
 - e. Junction boxes and drivers can be placed within 30 feet of the panels.

2.3 CLADDING SUPPORT SYSTEM

- A. Basis of Design Product: Subject to compliance with requirements, provide MFI System Rainscreen by Knight Wall Systems.
- B. Coating: ASTM A1046 zinc-aluminum-magnesium min thickness ZM40.
 1. ASTM A653 galvanized steel is not acceptable.
- C. Steel Classification: Structural Steel, Grade 50, 50 ksi yield.
- D. Spacing: Per Delegated Design Engineer's requirements.
- E. Rainscreen System:
 1. Thermally Isolated Clips/Brackets: Knightwall ThermaBracket – D.
 - a. Thermostop, preassembled thermal isolation assembly spacers at each end of clip.
 - 1) Stem isolator.
 - 2) Base Isolator.
 - b. Bracket Thickness: As determined by Delegated Design, minimum 0.074 inch thick (14 gage) sheet steel.
 - c. Bracket Base Dimensions: 3-1/8 inch high by 2-1/8 inch wide.
 - d. Overall Bracket Depth: 5 inches including thermal isolators.

- 1) Or lengths as required per the Delegated Design to achieve the exterior panel face dimension as indicated on the A5 Series Drawings.
 - e. Pre-punched holes: two per bracket for anchors.
 - f. Rail Connector Stem, Pilot Drill Holes:
 - 1) Holes allow minimum 0.75 inch adjustment allowing for aligning and plumbing of framing, independent of substrate irregularities and proper cladding installation.
 - 2) Spaced appropriately to maintain proper alignment of rails.
2. Girt Rails: Knightwall D – Rail.
- a. Profile: C channel, two flanges of equal length and one web.
 - b. Thickness: As determined by Delegated Design, minimum 0.074-inch thick (14 gauge) cold-formed steel.
 - c. Nominal Dimensions: Minimum 1.625 inch flange for attaching to wall bracket and 1.625 inch at web.
 - d. Adjustment Capability: 0.75 inches.
 - e. Pre-Punched Attachment Holes: 1.0 inch on center along length of track and oversized allowing for thermal contraction and expansion of rail without placing stress on brackets.

2.4 MISCELLANEOUS MATERIALS

- A. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal panels.
- B. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- C. Cladding Support System Fasteners:
 1. Sufficient length to provide solid attachment through rigid insulation to structure as required by delegated design engineer.
 2. Thermal Isolating Washers: Minimum 0.125 inch thick Polyoxymethylene copolymer (POM) washers with integral centering lip to act as a thermal break between wall anchor fasteners and girt.
 - a. Tensile Yield Strength: 9.57 ksi per ISO 527.
 - b. Melting Temperature: 329 degrees Fahrenheit per ISO 3146.
 - c. Basis of Design: ThermaStop Isolator by Knight Wall Systems.
 3. Horizontal Girts to Steel Cold-Formed Framing: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
 - a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
 - b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.

4. Steel stud framing substrate: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
 - a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
 - b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.
5. Concrete and Concrete Masonry Units Substrate:
 - a. Embedment depth: 1.25 inches minimum.
 - b. Minimum ultimate pull-out capacity from substrate material: 450 pounds.
 - c. 1/4-inch Kwik-Con II+ by Hilti.
- D. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.

2.5 FABRICATION

- A. Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. Fabricate metal panel joints with factory-installed captive gaskets or separator strips that provide a weathertight seal and prevent metal-to-metal contact, and that minimize noise from movements.
- D. 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.
 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 2. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

2.6 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. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils. Prepare, treat, and coat metal to comply with resin manufacturer's written instructions.
 - a. Color and Gloss: As indicated by manufacturer's designations.
2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
 1. Examine wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. 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 C754 and metal panel manufacturer's written recommendations.

3.3 CLADDING SUPPORT SYSTEM INSTALLATION

- A. Preparation: Review areas of potential interference and conflicts and coordinate layout and support provisions for interfacing work.
- B. Installation: Install in strict accordance with manufacturer's installation instructions.
- C. Wall Brackets and Rail:
 1. Mount wall brackets horizontally on support wall at stud locations. Spacing and location as determined by Delegated Design.

- a. Brackets must be laid out at 0.5 inch increments vertically or horizontally.
 - b. Place sealant at the bracket hole and on the screw to make the screw penetration through the exterior sheathing watertight.
 - c. Tighten screws to substructure to a snug tight condition and not stripped. Do not over-torque beyond manufacturer's recommendation. If installed using hand tools, verify for each installer at beginning of project using snug-tight criteria. Do not use stripped holes.
2. Thermally isolate wall bracket attachments by sandwiching thermal break material between metal bracket and support wall substrate.
 3. Thermally isolate screw fastener washers using material to thermally isolate fastener heads from metal bracket.
 4. Mineral Fiber Insulation: Install to expand into and friction fit between wall brackets as specified by Section 072100 "Thermal Insulation" prior to installing wall panel framing.
 5. Attach rail to wall bracket stem by use of a self-tapping screw fastener through the pre-punched holes in the rail and into the pre-punched pilot holes on the bracket.
 6. Isolate primary rail from bracket by sandwiching a thermal break material between rail and bracket stem.
 7. Attach primary rail at proper pre-punched pilot holes on bracket stem to align plumb and true. Account for irregularities in support wall.
- D. Touch-up shop-applied protective coatings damaged during handling and installation.
- E. Use shearing instruments (i.e. snips, nibbler, etc.) for cutting metal framing components. Saws are not recommended, as the sparks produced during cutting will damage the anti-corrosion coating. If sparks are generated during cutting, be sure the portion of the component to be installed on the building is protected from sparks and that any stockpile near the cutting station is also protected.
- F. The systems components should not be cut while installed on the building, unless using a shearing instrument.
- G. Replace thermal isolator pieces that break during installation.
- H. Provide a 3/8" – 1/2" gap between girts for expansion when multiple lengths of rail are installed.
1. Install splice clips per manufacturer's instructions. Splice clips must maintain planer alignment.
- I. Provide gaps between vertical girts where required for floor movement. Gap size to be determined per Delegated Design Engineer.
1. Install splice clips per manufacturer's instructions. Splice clips must maintain planer alignment.
- J. Minimum length of installed cut primary rail is 12" and must be attached to at least two separate wall brackets to prevent rotation of rail. Unsupported cantilever must not exceed 6" unless specified differently by manufacturer's engineer.
- 3.4 INSTALLATION
- A. Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated. Install panels perpendicular to supports unless otherwise indicated. Anchor metal 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 panels.
2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
3. Install screw fasteners in predrilled holes.
4. Locate and space fastenings in uniform vertical and horizontal alignment.
5. Install flashing and trim as metal panel work proceeds.
6. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws.
7. Fasten flashings and trim around openings and similar elements with self-tapping screws.
8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.

B. Fasteners:

1. Aluminum Panels: Use aluminum or stainless steel fasteners.

C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by metal panel manufacturer.

D. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.

1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal wall panel manufacturer; or, if not indicated, provide types recommended by metal panel manufacturer.

E. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and achieve waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 CLEANING AND PROTECTION

A. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.

B. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 074213.23

METAL COMPOSITE MATERIAL WALL PANELS

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 composite material panels
- 2. Metal composite material systems.
- 3. Cladding support system.

- B. Related Sections include the following:

- 1. Section 014001 "Mock Ups" for exterior wall mock-ups that include the metal composite material panels.
- 2. Section 055000 "Metal Fabrications" for metal stud structural support framing.
- 3. Section 061600 "Sheathing" for exterior sheathing substrate.
- 4. Section 072726 "Fluid-Applied Membrane Air and Water-Resistive Barriers" applied at exterior sheathing as required for this wall panel system to meet requirements of AAMA 508 Pressure Equalized Rainscreen systems.
- 5. Section 076200 "Sheet Metal Flashing and Trim" for metal flashing and trim not provided in this section.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Meet with Owner, Architect, metal composite material panel Installer, metal composite material panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal composite material panels, including installers of doors, windows, and louvers.
- 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- 3. Review methods and procedures related to metal composite material panel installation, including manufacturer's written instructions.
- 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
- 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal composite material panels.
- 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.

7. Review temporary protection requirements for metal composite material panel assembly during and after installation.
8. Review procedures for repair of panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 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.
2. Provide data sheets for testing agencies design designations for fire resistance ratings.
3. Provide data sheets for NFPA 285 testing of the Metal Composite Material Wall Panel Systems.

B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

C. 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.
3. Provide signed and sealed drawings, by a qualified design professional in Project jurisdiction, of metal composite material system showing compliance with performance requirements and design criteria identified for this Project.

D. Samples for Verification: For each type of Metal Composite Material Panel and System required, with factory-applied color finishes.

1. Metal Composite Material Panel: 4 by 6 inches.

E. Delegated-Design Submittal: Metal Composite Wall Panel System Fabricators complete system including the Panel Attachment Framing System and the Cladding Support System. Submittal to show compliance with performance requirements and design criteria, including analysis data and calculations, signed and sealed by the qualified professional engineer responsible for their preparation.

F. Qualification Data: For Installer.

G. Sample Warranties: For special warranties.

H. Maintenance Data: For metal composite material panels to include in maintenance manuals.

1.5 QUALITY ASSURANCE

A. Fabricator: Approved by MCM panel manufacturer.

B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

- C. Delegated Design Engineer: A professional engineer who is legally qualified to practice in the State of Ohio, where Project is located, and who is experienced in providing engineering services of the type indicated.

1.6 MOCKUPS

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical metal composite material panel assembly as shown on Drawings, including supports, attachments, and accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Mockups: Comply with Section 014001 "Mockups".

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 leakproof, secure, and noncorrosive installation.

1.10 WARRANTY

- A. Panel Integrity and System Warranty: manufacturer agrees to repair or replace components of metal composite material panel systems that fail 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. Finishes Warranty: 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 D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design Metal Composite Wall Panel System.
- B. System Description for Design Requirements:
 - 1. Metal Composite Wall Panel System consist of the following:
 - a. Aluminum-Faced Composite Wall Panels.
 - b. Extruded aluminum panel framing, and panel supports.
 - c. Cladding support system.
 - 2. Pressure Equalized Rainscreen (PER) System: Wall Panel System to meet test protocols of AAMA 508.
 - a. System to include required air/water barrier and be designed to allow air movement behind panels and to drain any moisture in provided weep holes and channel framing.
- C. Structural Performance: Provide metal composite material panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E330:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Other Design Loads: As indicated on Drawings.
 - 3. Deflection Limits for wind loads:
 - a. For panel perimeter framing no greater than 1/180 of the span.

- b. For panel face material and stiffeners no greater than 1/60 of the span.
- D. Air Infiltration: Air leakage of not more than 0.06 cfm/sq. ft. when tested according to ASTM E283 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft.
- E. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E331 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- G. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- H. Fire Propagation Characteristics: Metal composite material wall panel system is to be part of an exterior wall assembly that has passed NFPA 285 testing.
- I. Fire-Test-Response Characteristics (Interior Panels): Panels shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
 - 1. Surface-Burning Characteristics: Comply with ASTM E84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25 or less.
 - b. Smoke-Developed Index: 450 or less.
 - 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 286.

2.2 METAL COMPOSITE MATERIAL WALL PANELS (Composite Metal Panels)

- A. Metal Composite Material Wall Panel Systems: Provide factory-formed and -assembled, metal composite material wall panels 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 one of the following:
 - a. Arconic, Inc.: Reynobond FR.
 - b. ALUCOBOND; 3A Composites USA, Inc.; Alucobond Plus.
 - c. Mitsubishi Chemical Composite America, Inc.; ALPOLIC/fr.

- B. Aluminum-Faced Composite Wall Panels: Formed with 0.020-inch- thick, coil-coated aluminum sheet facings.
 - 1. Panel Thickness: 0.157 inch (4mm).
 - 2. Core: Fire retardant.
 - 3. Exterior Finish: Two-coat fluoropolymer.
 - a. Color: As indicated by manufacturer's designations which are TBD.
- C. Panel Attachment System: Pressure Equalized Rainscreen (PER) System.
 - 1. Metal composite material formed and mounted on system fabricators panel frame extrusions which are field installed on panel systems support extrusions.
 - 2. Recessed reveals between panels – Metal composite material bent forming sides of reveal and panel material spline/reveal strip at back of reveal fixed in aluminum panel frame extrusions.
- D. Panel Attachment System Framing and Components:
 - 1. Formed from extruded aluminum ASTM B221, 6063-T5 Aluminum.
 - a. Attachment system to meet the specified design loads and system test performance according to the metal composite material systems fabricators design.
 - b. Galvanized steel cold formed steel clips or staggered aluminum angles are not to be acceptable for panel to panel attachment.
 - 2. Panel stiffeners as required, shall be positively engaged in the perimeter extrusion or mechanically to the perimeter extrusion and secured with to the rear face of the metal composite panel with silicone or high-strength double-sided tape.
 - a. Panel stiffeners to be extruded aluminum or 300 Series stainless steel. Galvanized or metal composite material are not to be used.

2.3 CLADDING SUPPORT SYSTEM (Girt Rails on Thermally Isolated Clips)

- A. Basis of Design Product: Subject to compliance with requirements, provide MFI System Rainscreen by Knight Wall Systems.
- B. Coating: ASTM A1046 zinc-aluminum-magnesium min thickness ZM40.
 - 1. ASTM A653 galvanized steel is not acceptable.
- C. Steel Classification: Structural Steel, Grade 50, 50 ksi yield.
- D. Spacing: Per Delegated Design Engineer's requirements.
- E. Rainscreen System:
 - 1. Thermally Isolated Clips/Brackets: Knightwall ThermaBracket – D.
 - a. Thermastop, preassembled thermal isolation assembly spacers at each end of clip.
 - 1) Stem isolator.
 - 2) Base Isolator.

- b. Bracket Thickness: As determined by Delegated Design, minimum 0.074 inch thick (14 gage) sheet steel.
 - c. Bracket Base Dimensions: 3-1/8 inch high by 2-1/8 inch wide.
 - d. Overall Bracket Depth: 5 inches including thermal isolators.
 - 1) Or lengths as required per the Delegated Design to achieve the exterior panel face dimension as indicated on the A5 Series Drawings.
 - e. Pre-punched holes: two per bracket for anchors.
 - f. Rail Connector Stem, Pilot Drill Holes:
 - 1) Holes allow minimum 0.75 inch adjustment allowing for aligning and plumbing of framing, independent of substrate irregularities and proper cladding installation.
 - 2) Spaced appropriately to maintain proper alignment of rails.
2. Girt Rails: Knightwall D – Rail.
- a. Profile: C channel, two flanges of equal length and one web.
 - b. Thickness: As determined by Delegated Design, minimum 0.074-inch thick (14 gauge) cold-formed steel.
 - c. Nominal Dimensions: Minimum 1.625 inch flange for attaching to wall bracket and 1.625 inch at web.
 - d. Adjustment Capability: 0.75 inches.
 - e. Pre-Punched Attachment Holes: 1.0 inch on center along length of track and oversized allowing for thermal contraction and expansion of rail without placing stress on brackets.
3. Secondary Rails: Knightwall PanelRail. For use as determined by Delegated Design.
- a. Profile: Hat channel shape, 0.75 inches deep.
 - b. Thickness: As determined by Delegated Design, minimum 0.054-inch thick (16 gauge) cold-formed steel.
 - c. Nominal Dimensions: Minimum 2 inch hat channel for wall panel framing to attach to. Provide Manufacturers wider sizes per Delegated Design.

2.4 MISCELLANEOUS MATERIALS

- A. Metal Subframing and Furring (For Interior Panels): ASTM C955 cold-formed, metallic-coated steel sheet ASTM A653/A653M, G90 (Z275) hot-dip galvanized coating designation or ASTM A792/A792M, Class AZ50 (Class AZM150) aluminum-zinc-alloy coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of MCM system.
- B. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal composite material panels unless otherwise indicated.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal composite material panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jambs, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal composite material panels.

- D. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide exposed fasteners with heads matching color of metal composite material panels by means of plastic caps or factory-applied coating. Provide EPDM or PVC sealing washers for exposed fasteners.
- E. Cladding Support System Fasteners:
 - 1. Sufficient length to provide solid attachment through rigid insulation to structure as required by delegated design engineer.
 - 2. Thermal Isolating Washers: Minimum 0.125 inch thick Polyoxymethylene copolymer (POM) washers with integral centering lip to act as a thermal break between wall anchor fasteners and girt.
 - a. Tensile Yield Strength: 9.57 ksi per ISO 527.
 - b. Melting Temperature: 329 degrees Fahrenheit per ISO 3146.
 - c. Basis of Design: ThermaStop Isolator by Knight Wall Systems.
 - 3. Steel stud framing substrate: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
 - a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
 - b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.
 - 4. Concrete and Concrete Masonry Units Substrate:
 - a. Embedment depth: 1.25 inches minimum.
 - b. Minimum ultimate pull-out capacity from substrate material: 450 pounds.
 - c. 1/4-inch Kwik-Con II+ by Hilti.
- F. Panel Sealants: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal composite material panels and remain weathertight; and as recommended in writing by metal composite material panel manufacturer.

2.5 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 weathertight seal 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.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.

4. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.6 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. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 2. Composite Metal Panel Colors:
 - a. CMP-1: PPG Duranar TBD.
 - b. CMP-2: PPG Duranar TBD.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, 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 wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal composite material wall panel manufacturer.
 2. Examine wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal composite material wall panel manufacturer.
 - a. Verify that air- or water-resistive barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Examine roughing-in for components and assemblies penetrating metal composite material panels to verify actual locations of penetrations relative to seam locations of metal composite material panels before installation.

- C. 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 C754 and metal composite material panel manufacturer's written recommendations.

3.3 CLADDING SUPPORT SYSTEM INSTALLATION

- A. Preparation: Review areas of potential interference and conflicts and coordinate layout and support provisions for interfacing work.
- B. Installation: Install in strict accordance with manufacturer's installation instructions.
- C. Wall Brackets and Rail:
 - 1. Mount wall brackets horizontally on support wall at stud locations. Spacing and location as determined by Delegated Design.
 - a. Brackets must be laid out at 0.5 inch increments vertically or horizontally.
 - b. Place sealant at the bracket hole and on the screw to make the screw penetration through the exterior sheathing watertight.
 - c. Tighten screws to substructure to a snug tight condition and not stripped. Do not over-torque beyond manufacturer's recommendation. If installed using hand tools, verify for each installer at beginning of project using snug-tight criteria. Do not use stripped holes.
 - 2. Thermally isolate wall bracket attachments by sandwiching thermal break material between metal bracket and support wall substrate.
 - 3. Thermally isolate screw fastener washers using material to thermally isolate fastener heads from metal bracket.
 - 4. Mineral Fiber Insulation: Install to expand into and friction fit between wall brackets as specified by Section 072100 "Thermal Insulation" prior to installing wall panel framing.
 - 5. Attach rail to wall bracket stem by use of a self-tapping screw fastener through the pre-punched holes in the rail and into the pre-punched pilot holes on the bracket.
 - 6. Isolate primary rail from bracket by sandwiching a thermal break material between rail and bracket stem.
 - 7. Attach primary rail at proper pre-punched pilot holes on bracket stem to align plumb and true. Account for irregularities in support wall.
- D. Touch-up shop-applied protective coatings damaged during handling and installation.
- E. Use shearing instruments (i.e. snips, nibbler, etc.) for cutting metal framing components. Saws are not recommended, as the sparks produced during cutting will damage the anti-corrosion coating. If sparks are generated during cutting, be sure the portion of the component to be installed on the building is protected from sparks and that any stockpile near the cutting station is also protected.
- F. The systems components should not be cut while installed on the building, unless using a shearing instrument.
- G. Replace thermal isolator pieces that break during installation.

- H. Provide a 3/8" – 1/2" gap between girts for expansion when multiple lengths of rail are installed.
 - 1. Install splice clips per manufacturer's instructions. Splice clips must maintain planer alignment.
- I. Provide gaps between vertical girts where required for floor movement. Gap size to be determined per Delegated Design Engineer.
 - 1. Install splice clips per manufacturer's instructions. Splice clips must maintain planer alignment.
- J. Minimum length of installed cut primary rail is 12" and must be attached to at least two separate wall brackets to prevent rotation of rail. Unsupported cantilever must not exceed 6" unless specified differently by manufacturer's engineer.

3.4 METAL COMPOSITE MATERIAL SYSTEM 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. Flash and seal metal composite material panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air-water-resistive barriers and flashings that will be concealed by metal composite material panels are installed.
 - 3. Install screw fasteners in predrilled holes.
 - 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 5. Install flashing and trim as metal composite material panel work proceeds.
 - 6. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 - 7. Align bottoms of metal composite material panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 - 8. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
 - 9. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action with gaskets or as recommended in writing by metal composite material system manufacturer.
 - 10. Attach metal composite material panels to supports at locations, spacings, and with fasteners recommended by manufacturer to meet listed performance requirements.
 - a. Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior; use aluminum or galvanized-steel fasteners for surfaces exposed to the interior.
- B. Attachment Assembly, General: Install attachment assembly required to support metal composite material wall panels and to provide a complete weathertight wall system, including subgirts, perimeter extrusions, tracks, drainage channels, panel clips, and anchor channels.
 - 1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
- C. Pressure Equalized Rainscreen (PER) System Installation: Install vertical and horizontal tracks/channels providing compartmentalization at locations, at spacings, and with fasteners recommended by system manufacturer.

1. Attach metal composite material panels by interlocking panel clips or perimeter extrusion into tracks/ channels in a sequential series.
 2. Insert matching metal composite material spline into tracks/channels at joint reveal locations.
 3. Install wall panels to allow individual panels to “free float” and be installed and removed without disturbing adjacent panels.
 4. Do not apply sealants to joints unless otherwise indicated.
- D. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal composite material panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items. Provide types indicated by metal composite material panel manufacturer; or, if not indicated, provide types recommended in writing by metal composite material panel manufacturer.
- E. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal composite material wall panel units within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and inspections.
1. Refer to Division 01 Section “Mock-ups”.
- B. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- C. Owners testing agent will prepare test and inspection reports.

3.7 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

SECTION 074229

TERRACOTTA WALL PANELS

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, but is not limited to, panelized terracotta rainscreen cladding system including the following:
 - 1. Extruded hollow clay (terracotta) panels.
 - 2. Aluminum vertical track and clip support framing.
 - 3. Silicon gaskets and isolators.
 - 4. Mechanical anchors and fasteners utilized for the installation of the system.
 - 5. Cladding support system that wall panels and vertical track system are secured to.
- B. Related Sections include the following:
 - 1. Section 014001 "Mock Ups" for exterior wall mock-ups that include the terracotta panels.
 - 2. Section 055000 "Metal Fabrications" for metal stud structural support framing.
 - 3. Section 061600 "Sheathing" for exterior sheathing substrate.
 - 4. Section 072726 "Fluid-Applied Membrane Air and Water-Resistive Barriers" at exterior sheathing.
 - 5. Section 076200 "Sheet Metal Flashing and Trim" for metal flashing and trim not provided in this section.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Meet with Owner, Contractor, Architect, terracotta panel rainscreen wall system Installer, structural-support Installer, and installers whose work interfaces with or affects terracotta wall panel rainscreen wall system.
 - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 3. Review methods and procedures related to terracotta panel rainscreen wall system installation, including manufacturer's written instructions.
 - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
 - 5. Review rain drainage work, flashings, special details, penetrations, openings, and condition of other construction that affect the terracotta panel rainscreen wall system.
 - 6. Review requirements, tests and inspections listed in this section.
 - 7. Review temporary protection requirements for the terracotta panel rainscreen wall system, during and after installation.

8. Review procedures for replacement of terracotta panels damaged after installation.
9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 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. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings:
 1. Include fabrication and installation layouts of terracotta panel rainscreen wall system components; details of edge conditions, joints, panel profiles, corners, anchorages, and attachment components; and special and unique details.
 2. Accessories: Include details of the flashing, trim and anchorage at a scale of not less than 6 inches per 12 inches (half scale). Indicate metal trims, flashings, closures, and accessories that are furnished by other trades to provide dimensional requirements that may affect the terracotta panel rainscreen system.
 3. Coordination Drawings: Scaled exterior elevations and details are to have the components of this sections Vertical Support Track and Cladding Support System consolidated and coordinated with-the following items:
 - a. Cold-formed metal framing system and exterior sheathing.
 - b. Cladding Support System attachment methods and required fasteners.
 - c. Continuous insulation placement and attachment methods.
 - d. Wall openings including doors, windows, louvers and glazed framing systems.
 - e. Wall mounted items and penetrations including pipes, electrical fixtures, lighting fixtures and any other utilities.
 - f. Other adjacent cladding systems or materials.
 - g. Required transition strip products, flashings and sealants from the different systems are to be clearly identified.
- D. Delegated-Design Submittal: Engineering analysis for terracotta rainscreen assembly, coordinated with structural cladding support system and cold formed framing design.
 1. To comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- E. Qualification Data: For Installer.
- F. Qualification Data: For Professional Engineer.
- G. Sample Warranties: For special warranties listed in this section.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For terracotta panels to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. **Installer Qualifications:** An entity that employs installers and supervisors with minimum of five (5) years' experience with terra cotta systems as would be designed, fabricated and installed on building projects similar to this building project, or who are approved by manufacturer or as follows:
 - 1. Installer will receive training at manufacturer's location prior to mock up installation and as required again, prior to installation of permanent work.
 - 2. Systems will be installed in strict compliance with manufacturer's installation instructions.
- B. **Manufacturer Qualifications:** A terracotta wall panel rainscreen system manufacturer, capable of manufacturing extruded terracotta panels and the support components, that meet or exceed the performance requirements indicated and of documenting this performance by test reports and calculations.
- C. **Source Limitations:** All primary products specified in this section will be supplied by a single manufacturer, experienced in designing and manufacturing terracotta panel rainscreen wall systems
- D. **Mockups:** Comply with Section 014001 "Mockups".
- E. **Delegated Design Engineer Qualifications:** Structural engineer licensed in the State of Ohio and experienced in design of complete terracotta rainscreen assembly of the type specified in this section with minimum five (5) years' experience and minimum three (3) completed projects of similar scale and scope as this project.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, terracotta panels, and other manufactured items so as not to be damaged or deformed. Package metal terracotta panels for protection during transportation and handling.
- B. Unload, store, and erect terracotta panel rainscreen wall system in a manner to prevent breakage, chipping, and surface damage.
- C. Store products in manufacturer's unopened packaging, covered with suitable weathertight and ventilated covering, until ready for installation. Do not store terracotta panel rainscreen wall system components in contact with other materials that might cause staining, chipping, breakage, or other surface damage.

1.8 FIELD CONDITIONS

- A. **Weather Limitations:** Proceed with installation only when existing and forecasted weather conditions permit assembly of terracotta panel rainscreen wall system to be performed according to manufacturers' written instructions and warranty requirements.

1.9 COORDINATION

- A. Coordinate terracotta panel rainscreen wall system installation with moisture drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a ventilated, secure, and noncorrosive installation while maintaining the continuity of the weather barrier.

- B. Coordinate terracotta panel system installation with all other exterior wall system components to insure that the final total wall assembly meets listed performance requirements fire resistance (NFPA 285).
- C. Coordinate terracotta panel system installation with the Cladding Support System that it is installed to and supported by. Insure that the final total wall assembly meets listed performance requirements for:
 - 1. Rainscreen (per AAMA 509-09).
 - 2. Air Infiltration (ASTM E 283).
 - 3. Water penetration (ASTM E 331 and AAMA 501.1).

1.10 WARRANTY

- A. Special Material Warranty: Manufacturer's standard form in which manufacturer agrees to furnish components of the terracotta panel rainscreen wall system that fail in materials and workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including aspects of terracotta performance defined in ASTM C67.
 - b. Deterioration of terracotta and other materials beyond normal weathering.
 - c. Terra cotta panel and/or system components that exhibit disengagement or detachment (or partial disengagement) from the building façade.
 - 2. Warranty Period: Five years from date of Substantial Completion.
- B. Special Installation Warranty: Installation Contractor's standard form in which installer agrees to repair or replace components of the terracotta panel rainscreen wall system that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including aspects of terracotta performance defined in ASTM C67.
 - b. Installation failures including movement of terracotta panels caused by the movement within the terracotta panel rainscreen wall system installation.
 - c. Deterioration of terracotta and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Substantial Completion.

1.11 EXTRA MATERIALS

- A. Furnish extra materials that match the products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. See Section 017700 "Closeout Procedures" for extra materials requirements and schedule.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements" to design the terracotta wall panel system.
1. Delegated Design includes coordination and integration with the following systems:
 - a. Cladding Support System that the terracotta wall panel system is to be designed to be fastened to and supported by.
 - b. Cold-formed metal framing system and exterior sheathing that Cladding Support System is to be fastened to and supported by.
- B. Structural Performance: Provide terracotta panel rainscreen wall system capable of withstanding the effects of the following loads, based on testing according to ASTM E330:
1. Wind Loads: As indicated on Structural Drawings but not less than a design load of positive and negative pressures up to 45 psf.
 2. Other Design Loads: As indicated on the Structural Drawings.
 3. Deflection Limits: No greater than 1/175 of the clear span or 5/8" whichever is less.
- C. Movement: Design, fabricate and install system to withstand building seismic and thermal movements including deflections, temperature change without buckling, distortion, joint failure, panel fallout or breakage or undue stress on system components, anchors or permanent deformation of any kind in accordance with AAMA 501.4 for Static Seismic and Wind Induced Interstory Drifts, and AAMA 501.6 for Dynamic Seismic Drift.
- D. Drained and Back Vented Rain Screen: Wall panel system has passed the test methods of AAMA 509-09 "Voluntary Test Method and Specification of Drained and Back Ventilated Rain Screen Wall Cladding System".
1. Air Infiltration: ASTM E 283. Allowable air infiltration will be 0.06 cfm or less per square foot when tested under a constant pressure of 6.24 psf.
 2. Static Water Penetration: ASTM E 331. No uncontrolled water penetration shall occur when tested in static mode, under a constant pressure of 12 psf with 5 gallons of water per hour applied per square foot for a period of 15 minutes.
 3. Dynamic Water Penetration: AAMA 501.1. No uncontrolled water penetration shall occur when tested in dynamic mode, under a constant pressure of 12 psf with 5 gallons of water per hour applied per square foot for a period of 15 minutes.
 4. The terracotta wall panel system and the CFS System it is supported from are designed to evacuate any moisture which penetrates beyond the outside surface materials.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 100 deg F, ambient; 120 deg F, material surfaces.
- F. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- G. Fire Test for Exterior Walls: The Terracotta Wall Panel System is to be part of exterior wall systems that comply with NFPA 285 – Standard Fire Test Method for Elevation of Fire Propagation Characteristics of exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.
1. Exterior cladding system is a listed component of the exterior wall system design that meets the requirements of NFPA 285.

2.2 TERRACOTTA PANEL RAINSCREEN WALL SYSTEM PANELS

- A. Extruded hollow core clay (terra cotta) panels hung on a pre-engineered aluminum track system with aluminum clip supports, gaskets, and trim.
1. The system shall consist of clay panels supported by extruded aluminum clips attached to aluminum vertical track.
 2. Terra cotta panels, which can only be removed on purpose, shall be attached to vertical track at base channels and head grooves with extruded aluminum clips wrapped with a silicone isolator.
 3. Silicone gaskets inserted into vertical track and silicone isolators wrapped around clips provide shadow line at vertical joint (standard black) and compression bubbles in each maintain panel position across the façade and prevent wind induced rattle.
 4. Track to be attached to specified portion of wall assembly structurally sufficient to carry the clay panel wall cladding system and associated loads.
- B. System shall be designed as a "drained and back vented rain screen" to allow for the following:
1. Drain water entering the cavity out from behind the cladding.
 2. Be vented to allow cavity to dry.
- C. Basis of Design: Subject to compliance with requirements, provide Piterak Slim 30 by Terreal North America, LLC or comparable products by the following:
1. Boston Valley Terra Cotta.
- D. Terracotta Wall Panels:
1. Panel Thickness: 1.181 inches, 1 3/16 inches nominal (30 mm).
 2. Panel Vertical Module Dimension: 16 inches (or as otherwise indicated on Drawings).
 3. Panel Horizontal Module Dimension: 48 inches (or as otherwise indicated on Drawings).
 4. Vertical Joint Type: Open joint.
 5. Vertical Joint Width: Per manufacturer.
 6. Horizontal Joint Type: Overlapping, ship-lap type.
 7. Panel Configuration: Hollow wall per manufacturer's standard extruding process.
 8. Finish Panel Production Tolerances:
 - a. Width: .039 inches for length to 60 inches (1.0 mm length to 1524 mm).
 - b. Height: .09375 inches up to 15 inches (2.38 mm to 381 mm).
 - c. Thickness: .0625 inches.
 - d. Straightness (sweep): 0.025% of length.
 - e. Diagonal Flatness: 0.025% of diagonal.
 - f. Vertical Flatness: 1.0% of height.

- g. Torsion: 0.025% of diagonal.
- 9. Color: Through-body Red-Orange, which is to be verified.
- 10. Exterior Finish/Texture: Smooth, which is to be verified.

2.3 TERRACOTTA WALL PANEL ATTACHMENT COMPONENTS

- A. General: All metal supporting members shall be fabricated from Alloy Aluminum for resistance to corrosion.
- B. Vertical Support Track: Attachment system by the terracotta wall panel manufacturer.
 - 1. Material: 6105 T5 Aluminum alloy, mill finish.
 - 2. Thickness: As required for structural performance of the terracotta panel rainscreen wall system, per manufacturer's standard installation requirements.
 - 3. Configuration: Extruded complex channel shape with flanged support legs and pre-punched slot openings per manufacturer's standard installation requirements.
 - a. Extruded top, standard and bottom clips that insert in vertical channel slots and secure panels.
 - 4. Member Depth: Manufacturer's standard.
 - 5. Member Horizontal Spacing: 12 inch.
- C. Gaskets:
 - 1. Material: Silicone, color Black.
 - 2. Gaskets run continuous on vertical track and are wrapped around all clips where in contact with terracotta panels.
- D. Fasteners:
 - 1. Material: 304 18-8, Stainless Steel.
 - 2. Type: Hex head, self-drilling screws per manufacturer's standards and per requirements listed.
 - 3. Size: As required for structural performance of the terracotta panel rainscreen wall system per Delegated Design.
 - 4. All fasteners must be manufactured in the United States of America.

2.4 CLADDING SUPPORT SYSTEM (Girt Rails on Thermally Isolated Clips)

- A. Basis of Design Product: Subject to compliance with requirements, provide MFI System Rainscreen by Knight Wall Systems.
- B. Coating: ASTM A1046 zinc-aluminum-magnesium min thickness ZM40.
 - 1. ASTM A653 galvanized steel is not acceptable.
- C. Steel Classification: Structural Steel, Grade 50, 50 ksi yield.
- D. Spacing: Per Delegated Design Engineer's requirements.
- E. Rainscreen System:

1. Thermally Isolated Clips/Brackets: Knightwall ThermaBracket – D.
 - a. Thermostop, preassembled thermal isolation assembly spacers at each end of clip.
 - 1) Stem isolator.
 - 2) Base Isolator.
 - b. Bracket Thickness: As determined by Delegated Design, minimum 0.074 inch thick (14 gage) sheet steel.
 - c. Bracket Base Dimensions: 3-1/8 inch high by 2-1/8 inch wide.
 - d. Overall Bracket Depth: 5 inches including thermal isolators.
 - 1) Or lengths as required per the Delegated Design to achieve the exterior panel face dimension as indicated on the A5 Series Drawings.
 - e. Pre-punched holes: two per bracket for anchors.
 - f. Rail Connector Stem, Pilot Drill Holes:
 - 1) Holes allow minimum 0.75 inch adjustment allowing for aligning and plumbing of framing, independent of substrate irregularities and proper cladding installation.
 - 2) Spaced appropriately to maintain proper alignment of rails.
2. Girt Rails: Knightwall D – Rail.
 - a. Profile: C channel, two flanges of equal length and one web.
 - b. Thickness: As determined by Delegated Design, minimum 0.074-inch thick (14 gauge) cold-formed steel.
 - c. Nominal Dimensions: Minimum 1.625 inch flange for attaching to wall bracket and 1.625 inch at web.
 - d. Adjustment Capability: 0.75 inches.
 - e. Pre-Punched Attachment Holes: 1.0 inch on center along length of track and oversized allowing for thermal contraction and expansion of rail without placing stress on brackets.
3. Secondary Rails: Knightwall PanelRail. For use as determined by Delegated Design.
 - a. Profile: Hat channel shape, 0.75 inches deep.
 - b. Thickness: As determined by Delegated Design, minimum 0.074-inch thick (14 gauge) cold-formed steel.
 - c. Nominal Dimensions: Minimum 2 inch hat channel for wall panel framing to attach to. Provide Manufacturers wider sizes per Delegated Design.

2.5 MISCELLANEOUS MATERIALS

- A. Flashing and Trim: Shall be aluminum material complying with the performance criteria specified and designed to allow adjustments of the system prior to being permanently installed. These items shall be shop fabricated.
- B. Shims: High impact plastic shims as recommended by manufacturer.
- C. Cladding Support System Fasteners:

1. Sufficient length to provide solid attachment through rigid insulation to structure as required by delegated design engineer.
2. Thermal Isolating Washers: Minimum 0.125 inch thick Polyoxymethylene copolymer (POM) washers with integral centering lip to act as a thermal break between wall anchor fasteners and girt.
 - a. Tensile Yield Strength: 9.57 ksi per ISO 527.
 - b. Melting Temperature: 329 degrees Fahrenheit per ISO 3146.
 - c. Basis of Design: ThermaStop Isolator by Knight Wall Systems.
3. Steel stud framing substrate: Self-drill hex-washer-head stainless steel with 1,000 hour salt-spray rated thermoset polyester coating.
 - a. Embedment depth: 0.625 inches or three full threads minimum, whichever is greater.
 - b. Minimum ultimate pull-out capacity from 18 gauge steel: 450 pounds.
4. Concrete and Concrete Masonry Units Substrate:
 - a. Embedment depth: 1.25 inches minimum.
 - b. Minimum ultimate pull-out capacity from substrate material: 450 pounds.
 - c. 1/4-inch Kwik-Con II+ by Hilti.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. It is the responsibility of the Installation Contractor to examine the structure scheduled to receive the terracotta panel rainscreen wall system and verify that it is capable of supporting the loads from the Work specified in this section. Note deficiencies immediately and do not proceed with erection of terracotta panel rainscreen wall system until such deficiencies have been corrected or addressed by the Architect.
- B. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances for the terracotta material panel supports, and other conditions affecting performance of the Work.
 1. Examine Composite Framing Support (CFS) system to verify that girts, angles, channels, and other structural panel support members and anchorage have been installed within alignment tolerances required by terracotta wall panel manufacturer's written installation instructions.
- C. Examine roughing-in for components and assemblies penetrating terracotta panels to verify actual locations of penetrations relative to terracotta panel rainscreen wall system support framing and joints before commencement of work.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Coordinate terracotta panel rainscreen wall system with rain drainage work; flashing; trim; and construction of soffits, roofing, parapets, walls, and other adjoining work to provide a secure and noncorrosive installation.

3.3 CLADDING SUPPORT SYSTEM INSTALLATION

- A. Preparation: Review areas of potential interference and conflicts and coordinate layout and support provisions for interfacing work.
- B. Installation: Install in strict accordance with manufacturer's installation instructions.
- C. Wall Brackets and Rail:
 - 1. Mount wall brackets horizontally on support wall at stud locations. Spacing and location as determined by Delegated Design.
 - a. Brackets must be laid out at 0.5 inch increments vertically or horizontally.
 - b. Place sealant at the bracket hole and on the screw to make the screw penetration through the exterior sheathing watertight.
 - c. Tighten screws to substructure to a snug tight condition and not stripped. Do not over-torque beyond manufacturer's recommendation. If installed using hand tools, verify for each installer at beginning of project using snug-tight criteria. Do not use stripped holes.
 - 2. Thermally isolate wall bracket attachments by sandwiching thermal break material between metal bracket and support wall substrate.
 - 3. Thermally isolate screw fastener washers using material to thermally isolate fastener heads from metal bracket.
 - 4. Mineral Fiber Insulation: Install to expand into and friction fit between wall brackets as specified by Section 072100 "Thermal Insulation" prior to installing wall panel framing.
 - 5. Attach rail to wall bracket stem by use of a self-tapping screw fastener through the pre-punched holes in the rail and into the pre-punched pilot holes on the bracket.
 - 6. Isolate primary rail from bracket by sandwiching a thermal break material between rail and bracket stem.
 - 7. Attach primary rail at proper pre-punched pilot holes on bracket stem to align plumb and true. Account for irregularities in support wall.
- D. Touch-up shop-applied protective coatings damaged during handling and installation.
- E. Use shearing instruments (i.e. snips, nibbler, etc.) for cutting metal framing components. Saws are not recommended, as the sparks produced during cutting will damage the anti-corrosion coating. If sparks are generated during cutting, be sure the portion of the component to be installed on the building is protected from sparks and that any stockpile near the cutting station is also protected.
- F. The systems components should not be cut while installed on the building, unless using a shearing instrument.
- G. Replace thermal isolator pieces that break during installation.
- H. Provide a 3/8" – 1/2" gap between girts for expansion when multiple lengths of rail are installed.
 - 1. Install splice clips per manufacturer's instructions. Splice clips must maintain planer alignment.
- I. Provide gaps between vertical girts where required for floor movement. Gap size to be determined per Delegated Design Engineer.

1. Install splice clips per manufacturer's instructions. Splice clips must maintain planer alignment.
- J. Minimum length of installed cut primary rail is 12" and must be attached to at least two separate wall brackets to prevent rotation of rail. Unsupported cantilever must not exceed 6" unless specified differently by manufacturer's engineer.

3.4 TERRACOTTA PANEL INSTALLATION

- A. General: Comply with the system manufacturer's written instruction and recommendations for installation as they apply to project conditions and supporting substrates in the orientation, sizes, and locations indicated on Drawings. Anchor system and other components of the Work securely in place, with provisions for thermal and structural movement.
 1. Shim or otherwise plumb vertical support profiles from installed framing scheduled to receive the terracotta panel rainscreen system.
 2. Field cutting of terracotta panels is not permitted except to accommodate components and assemblies penetrating terracotta panels, or form corners as detailed in the shop drawings.
 3. Required field cutting is to be with wet saws and diamond tipped blades.
 4. Do not begin installation until flashings and insulation that will be concealed by the terracotta panel rainscreen wall system are installed.
 5. Install this systems flashings and trims as terracotta panel rainscreen wall system work proceeds.
 6. Align edges of terracotta panels with adjacent terracotta panels as indicated on shop drawings.
- B. Fasteners:
 1. Use stainless-steel fasteners for all work.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by manufacturer of dissimilar metals.
- D. Attachment Assembly, General: Install attachment assembly required to support terracotta wall panels and to provide a complete rainscreen wall system, including horizontal support framing.
 1. Install aluminum support framing plumb and level in locations indicated on approved shop drawings and the terracotta panel rainscreen wall system manufacturer's written recommendations.
 2. Install support framing to allow for installation of flashings, trims, and accessories per the approved shop drawings and the terracotta panel rainscreen wall system manufacturer's written recommendations.
 3. Support framing members may be shimmed from the face flanges of the primary framing system (CFS System) per the terracotta panel rainscreen wall system manufacturer's written recommendations.
 4. Fasteners should not typically penetrate the weather resistant barrier at the face of the exterior wall sheathing. Seal any fasteners that do.
- E. Installation: Install terracotta wall panels on supports at locations and spacings to achieve performance requirements specified and per the terracotta panel rainscreen wall system's approved shop drawings and manufacturer's written instructions and recommendations.
 1. Do not install broken, chipped, cracked, or otherwise damaged terracotta wall panels.

2. Install terracotta panels to maintain the horizontal and vertical reveal spacing defined on the approved shop drawings and per the terracotta panel rainscreen wall system manufacturer's written instructions and recommendations.
 3. Maintain gaskets on extruded profiles and attachment clips. Reinstall or if needed replace damaged/missing gaskets per approved shop drawings and terracotta manufacturer's written installation instructions and recommendations.
 4. Do not apply sealants to joints unless otherwise indicated.
- F. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that are permanently watertight.
1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
 2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1-inch deep, filled with mastic sealant (concealed within joints).

3.5 ERECTION TOLERANCES

- A. Shim and align metal support framing to allow the final terracotta wall panel assembly to be plumb, true, untwisted, and in assembly plane.
- B. Installation Tolerances: Measurements are taken on the final installed exposed surface to view. Installation tolerances shall be defined as:
 1. Plumb: 1/8 inch in 10 feet, 1/4 inch in 40 feet, non-cumulative.
 2. Level: 1/8 inch in 20 feet, 1/4 inch in 40 feet, non-cumulative.
 3. Alignment & Offsets: limit to 1/8 inch.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing agency to perform field tests and inspections.
 1. Refer to Division 01 Section "Mock-ups".
- B. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- C. Owner's testing agent will prepare test and inspection reports.

3.7 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if applicable, as terracotta panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of terracotta panel rainscreen wall system installation, clean finished surfaces as recommended by terracotta manufacturer. Maintain in a clean condition during construction.

- B. Cleaning: No cleaning treatment or chemicals should be applied to the terracotta panels without the manufacturer's written authorization. Clean soiled areas with materials that will not damage or harm the terracotta panels or adjacent materials. Mild detergents approved by the terracotta manufacturer in writing with a soft natural bristle brush may be used.
 - 1. If pressure washing of surfaces is approved, it must be done with pressure washer to not exceed 1200 psi.
- C. After terracotta panel rainscreen wall system installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- D. Replace terracotta panels that have been damaged or have deteriorated beyond successful repair.
- E. Protect installed products from contact with contaminating substances resulting from construction operations. In addition, monitor terracotta surfaces that are adjacent to exterior concrete and masonry surfaces during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances do contact the terracotta surface, remove contaminants immediately per the terracotta manufacturer's written instructions and recommendations.

END OF SECTION

SECTION 075323

EPDM ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

1. Adhered ethylene-propylene-diene-terpolymer, EPDM, membrane roofing system.

- B. Related Sections include the following:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 076200 "Sheet Metal Flashing and Trim" for metal roof penetration flashings, flashings, and counterflashings.
3. Section 077100 "Roof Specialties" for manufactured copings and roof edge fascia supplied by roof system manufacturer.
4. Section 079513.16 "Exterior Expansion Joint Cover Assemblies" for roof expansion joint backer rod.
5. Division 22 Section for roof drains.

1.3 ROOF SYSTEM SCHEDULE

- A. Roof System 1 – Metal Deck

1. EPDM Roof Membrane, 60 mil, reinforced, black – Fully adhered.
2. Insulation Board, 2 inches, 20 psi. – Fully adhered.
3. Insulation Board, 2 inches, 20 psi. – Fully adhered.
4. Vapor Retarder – 30 mil, 0.1 perm max - Self adhered. Prime substrate per manufactures instructions.
5. Glass matt gypsum roof substrate board, 5/8 inch – Mechanically fastened.

- B. Roof System 1 – Concrete Deck

1. EPDM Roof Membrane, 60 mil, reinforced, black – Fully adhered.
2. Insulation Board, 2 inches, 20 psi. – Fully adhered.
3. Insulation Board, 2 inches, 20 psi. – Fully adhered.
4. Vapor Retarder – 30 mil, 0.1 perm max - Self adhered. Concrete must be primed with manufacturer's approved product prior to application of vapor retarder.

1.4 DEFINITIONS

- A. Roofing Terminology: Refer to ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.
- B. Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," before multiplication by a safety factor.
- C. Factored Design Uplift Pressure: The uplift pressure, calculated according to procedures in SPRI's "Wind Load Design Guide for Fully Adhered and Mechanically Fastened Roofing Systems," after multiplication by a safety factor.

1.5 PERFORMANCE REQUIREMENTS

- A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.
- B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.
- C. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- D. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system for the following:
 - 1. Fire/Windstorm Classification: Class1A-90.
 - 2. Hail-Resistance Rating: MH.

1.6 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other Work.
 - 1. Base flashings and membrane terminations.
 - 2. Tapered insulation layout, thickness and slopes.
 - 3. Fastening patterns for corners, perimeter and field-of-roof locations for substrate boards at metal deck.
 - 4. Insulation adhesion patterns.
- C. Qualification Data for Installer:
 - 1. Licensed Contractor Letter: Signed by roofing system manufacturer certifying that Installer is approved, authorized, or licensed by manufacturer to install roofing system.
 - 2. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified.

- D. Maintenance Data: For roofing system to include in maintenance manuals.
- E. Warranties: Special warranties specified in this Section.
- F. Inspection Report: Copy of roofing system manufacturer's inspection report of completed roofing installation.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's warranty.
- B. Manufacturer Qualifications: A qualified manufacturer that has UL listing for membrane roofing system identical to that used for this Project.
- C. Source Limitations: Obtain components for membrane roofing system from same manufacturer as roofing membrane or that are approved by roofing membrane manufacturer.
- D. Fire-Test-Response Characteristics: Provide membrane roofing materials with the fire-test-response characteristics indicated as determined by testing identical products per test method below by UL, FMG, or another testing and inspecting agency acceptable to authorities having jurisdiction. Materials shall be identified with appropriate markings of applicable testing and inspecting agency
 - 1. Exterior Fire-Test Exposure: Class A; ASTM E 108, for application and roof slopes indicated.
 - 2. Fire-Resistance Ratings: ASTM E 119, for fire-resistance-rated roof assemblies of which roofing system is a part.
- E. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to roofing system including, but not limited to, the following:
 - 1. Meet with Owner; Architect, Construction Manager and Owner's insurer if applicable; roofing Installer; roofing system manufacturer's representative; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 - 3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review and finalize construction schedule as it relates to seasonal low temperatures when roofing cannot be installed or when low temperature accessory materials are required.
 - 5. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 - 6. Review structural loading limitations of roof deck during and after roofing.
 - 7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 - 8. Review governing regulations and requirements for insurance and certificates if applicable.
 - 9. Review temporary protection requirements for roofing system during and after installation.
 - 10. Review roof observation and repair procedures after roofing installation.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
 - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.9 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- B. Cold Weather Provisions: Contractor is responsible for coordinating roofing installation with seasonal weather conditions. Contractor is responsible to change required materials such as primers and adhesives to allow roofing installation in low temperatures. Cost for low temperature products are to be covered in the Base Bid.

1.10 WARRANTY

- A. Quotations for the base bid will include a 20-year NDL (no dollar limit) Total System Warranty and a 2-year NDL (no dollar limit) Total System Installation Warranty.
- B. Roofing System Warranty: Manufacturer's standard form, without monetary limitation, in which manufacturer agrees to repair or replace components of membrane roofing system that fail in materials or workmanship within specified warranty period. Any water leakage during this warranty period will be corrected as to maintain the roofing system in watertight condition.
 - 1. Warranty includes roofing membrane system, base flashings, roofing accessories, roof insulation, fasteners, vapor retarders, substrate board, roof-related metal trims, edges and copings, walkway products and other roof-related manufacturer-branded components of membrane roofing system.
 - 2. Warranty Period: 20 years from date of Substantial Completion with a 72-mph wind speed limit.
 - a. Wind speed value is nominal design, 3 second gust winds speeds in miles per hour at 33 feet above ground.
- C. Installers Workmanship Warranty: Roofing Installer's standard form, without monetary limitation, in which Installer agrees to repair or replace components of membrane roofing system that fail in

materials or workmanship within specified warranty period. Any water leakage during this warranty period will be corrected as to maintain the roofing system in watertight condition.

1. Warranty includes roofing membrane system, base flashings, roofing accessories, roof insulation, fasteners, vapor retarders, substrate board, roof-related metal trims, edges and copings, walkway products and other roof-related manufacturer-branded components of membrane roofing system.
2. Warranty Period: 2 years from date of Substantial Completion with a 72-mph wind speed limit.

D. Pro-rated System Warranties shall not be accepted.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where subparagraph titles below introduce lists, the following requirements apply for product selection:
1. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.2 EPDM ROOFING MEMBRANE

- A. EPDM Roofing Membrane: ASTM D 4637, Type II, scrim or fabric internally reinforced, flexible sheet made from EPDM, and as follows:
1. Manufacturers/Products:
 - a. Carlisle SynTec Incorporated.; Sure-Tough Reinforced EPDM Roofing System.
 - b. Firestone Building Products Co.; RubberGard Max EPDM Roofing System.
 - c. Johns Manville; JM EPDM R 60 Mil.
 2. Thickness: 60 mils, nominal.
 3. Exposed Face Color: Black.
 4. Three-inch-wide factory laminated tape continuous along one edge of membrane panels.

2.3 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with membrane roofing.
1. Liquid-type auxiliary materials shall meet VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: 60-mil- thick EPDM, according to application per manufacturer's details.
- C. Prefabricated Pipe and Conduit Flashing: As recommended by roof membrane manufacturer.
1. Carlisle SynTec Incorporated Pressure Sensitive Pipe Seals.
 2. Firestone Building Products Pre-Molded Quickseam pipe flashing and conduit flashing.
 3. Johns Manville JM EPDM Peel & Stick Pipe Boots.

4. Provide stainless steel storm collar with stainless steel clamp at all locations. Size to match pipe being flashed.
- D. Primer: For use to prime and prepare concrete substrate surface.
1. Carlisle SynTec Incorporated HP-250 Primer.
 2. Firestone Building Products SA-Solvent Based (SB) Primer.
 3. Johns Manville JM SA Primer.
- E. Bonding Adhesive: Manufacturer's standard bonding adhesive.
- F. Seaming Material:
1. In seam material: Manufacturer's standard synthetic-rubber polymer primer and 6-inch-wide minimum, butyl splice tape with release paper or film.
 - a. Carlisle SynTec Incorporated Pressure-Sensitive SecurTAPE.
 - b. Firestone Building Products Quick Seam Tape.
 - c. Johns Manville JM EPDM Seam Tape Plus.
 2. Factory Applied Tape Seaming Materials:
 - a. Manufacturers Factory Applied Tape system may be used instead of field applied tape, 6 inch wide minimum.
 - b. To be installed per manufactures instructions to meet warranty requirements.
 3. Cover Tape Material: Manufacturer's standard synthetic-rubber polymer primer and 6-inch-wide minimum, cover tape with 12 inch wide overlayment strips and T-Joint cover tape with release paper or film.
 - a. To be installed per manufactures instructions to meet warranty requirements.
- G. Lap Sealant: Manufacturer's standard single-component sealant, color to match roofing membrane.
- H. Water Cutoff Mastic: Manufacturer's standard butyl mastic sealant.
- I. Metal Termination Bars: Manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 inch wide by 1/8-inch-thick; with anchors.
- J. Fasteners (at metal deck installation): Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening system components to substrate, and acceptable to membrane roofing system manufacturer.
- K. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, in-seam sealants, termination reglets, cover strips, and other accessories.
1. All metal clamping rings and other exposed metals to be stainless steel.
- 2.4 SUBSTRATE BOARD (AT METAL ROOF DECKS)
- A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum board.
1. Products: Subject to compliance with requirements, provide one of the following:

- a. Georgia-Pacific Building Product: Dens Deck Prime Fireguard.
 - b. United States Gypsum Company: Securock Ultralight Coated Glass Mat Roof Board.
2. Thickness: 5/8-inch, Type X.
 3. Surface Finish: Primed.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening substrate panel to roof deck.

2.5 VAPOR RETARDER

- A. Self-Adhering Sheet Vapor Retarder: ASTM D 1970/D 1970 M, polyethylene film laminated to layer of rubberized asphalt adhesive, minimum 30-mil total thickness; maximum permeance rating of 0.1 perm, cold applied, with slip-resisting surface and release paper backing. Provide primer when recommended by vapor retarder manufacturer.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Carlisle's VapAir Seal 725TR Air and Vapor Barrier/Temporary Roof.
 - b. Firestone Building Products Co., V-Force Vapor Barrier Membrane.
 - c. Johns Manville JM Vapor Barrier SA.

2.6 ROOF INSULATION

- A. General: Provide preformed roof insulation boards, manufactured or approved by EPDM roof membrane manufacturer, that comply with requirements and referenced standard. Select from manufacturer's standard sizes and of thicknesses indicated.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 2, Grade 2 glass-fiber mat facer on both major surfaces.
1. Manufacturers:
 - a. Carlisle SynTec Incorporated, Secure Shield Polyiso.
 - b. Firestone Building Products Co., Resista Iso or Isogard CG.
 - c. Johns Manville, ENRGY 3 CGF.
 2. Minimum overall thickness of insulation layers is not to be less than 4 inches (minimum R-value of 23.6).
 - a. First layer, Type II, Class 2, Grade 2 – 20 psi, 2 inches thick.
 - b. Second layer, Type II, Class 2 Grade 2 – 20 psi, 2 inches thick.
 - c. Johns Manville, High-Density ProtectoR HD.
- C. Tapered Insulation: Provide factory-tapered insulation boards.
1. Material: Match roof insulation.
 2. Slope:
 - a. Roof Field (at non-sloping structure): 1/4 inch per foot (1:48) unless otherwise indicated on Drawings.
 - b. Saddles and Crickets: 1/2 inch per foot (1:24) unless otherwise indicated on Drawings.

- D. Tapered Insulation Target Sumps: Provide factory assembled, ready to install target roof drain sumps.
 - 1. Material: Match roof insulation.
 - 2. Size and Slope:
 - a. 4' by 4' by minimum 1/2-inch slope, typical.

2.7 INSULATION ACCESSORIES

- A. General: Furnish roof insulation accessories recommended by insulation manufacturer for intended use and compatible with membrane roofing.
- B. Low-Rise, Urethane Adhesive: Roof system manufacturer's standard spray-applied, low-rise, two-component urethane adhesive formulated for compatibility and use with glass-fiber matt facer insulation.

2.8 WALKWAYS (Walkway Pads)

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, solid-rubber, slip-resisting, surface-textured walkway rolls, approximately 3/16-inch-thick, and acceptable to membrane roofing system manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and set and braced and that roof drains are securely clamped in place.
 - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. At steel deck substrates, verify that surface plane flatness and fastening of steel roof deck complies with requirements in Division 05 Section "Steel Decking."
 - 4. At concrete substrates, verify that minimum concrete drying period recommended by roofing system manufacturer has passed. Do not proceed with vapor retarder installation testing any sooner than twenty (20) days after concrete has been placed. Do not proceed with vapor retarder installation testing within 72 hours of rain or other precipitation.
 - 5. Verify that concrete substrate is visibly dry and free of moisture. Perform hand pull test with the specified primer and vapor retarder as recommended by roofing manufacturer and according to ASTM C 1583.
 - a. Test Frequency: One test per each 1,000 sq. ft. or portion thereof, of roof deck.
 - b. Submit test reports within 24 hours of performing tests.
 - 6. Verify that concrete curing compounds that will impair adhesion of roofing components to roof deck have been removed.
 - 7. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Where possible, provide tarps at concrete roof surfaces. Leave in place twenty (20) days prior to roof substrate preparation and testing.
- B. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- C. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- D. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 SUBSTRATE BOARD

- A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered not less than 24 inches between rows.
 - 1. Tightly butt substrate boards together.
 - 2. Cut substrate board to fit tight around penetrations and projections, and to fit tight to intersecting sloping roof decks.
 - 3. Fasten substrate board to top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to membrane roofing system manufacturers' written instructions.

3.4 VAPOR RETARDER INSTALLATION

- A. Self-Adhering Sheet Vapor Retarder: Prime substrates as required by manufacturer. Install self-adhering-sheet vapor retarder over area to receive vapor retarder, side and end lapping each sheet a minimum of 3-1/2 and 6 inches, respectively.
 - 1. Extend vertically up parapet walls and projections full height unless indicated otherwise.
 - 2. Seal laps per manufacturer's instructions.

3.5 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system manufacturer's written instructions for installing roof insulation.
- C. Installation:
 - 1. Install base layer and upper layers of insulation with end joints staggered not less than 12 inches in adjacent rows.

- a. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
- b. Trim insulation neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
- c. Make joints between adjacent insulation boards not more than 1/4 inch in width.
- d. At internal roof drains, install factory assembled tapered insulation target drain sumps.
 - 1) Insulation sumps to be fabricated so that thickness meets adjoining roof insulation thickness including cricket thicknesses. Water flow into insulation sump is to be unrestricted.
- e. Fill gaps exceeding 1/4 inch with insulation.
- f. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- g. Adhere base layer of insulation to vapor retarder according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:
 - 1) Set insulation in ribbons of spray-bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
 - a) Place weighted material, adhesive buckets, canisters or other, at board corners and seams to hold insulation in place until adhesive is set.

3.6 ADHERED ROOFING MEMBRANE INSTALLATION

- A. Install roofing membrane over area to receive roofing according to membrane roofing system manufacturer's written instructions. Unroll roofing membrane and allow to relax before installing.
- B. Start installation of roofing membrane in presence of membrane roofing system manufacturer's technical personnel.
- C. Accurately align roofing membrane and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Bonding Adhesive: Apply bonding adhesive to substrate and underside of roofing membrane at rate required by manufacturer and allow to partially dry before installing roofing membrane. Do not apply bonding adhesive to splice area of roofing membrane.
- E. In addition to adhering, mechanically fasten roofing membrane securely at terminations, penetrations, and perimeter of roofing.
- F. Apply roofing membrane with side laps shingled with slope of roof deck where possible.
- G. Tape Seam Installation:
 1. Field Seam Installation: Clean and prime both faces of splice areas, apply splice tape, and firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight installation.
 2. Factory-Applied Seam Tape Installation: Clean and prime surface to receive tape. Firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight installation.

3. Cover Tape Installation: Clean and prime surfaces to receive tape and apply cover tape. Firmly roll side and end laps of overlapping roofing membranes according to manufacturer's written instructions to ensure a watertight installation.

- H. Repair tears, voids, and lapped seams in roofing that does not meet requirements.
- I. Spread sealant or mastic bed over deck drain flange at deck drains and securely seal roofing membrane in place with clamping ring.
- J. Adhere protection sheet over roof membrane at locations indicated.

3.7 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply bonding adhesive to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean splice areas, apply splicing cement, and firmly roll side and end laps of overlapping sheets to ensure a watertight seam installation. Apply lap sealant and seal exposed edges of sheet flashing terminations.
- E. Terminate and seal top of sheet flashings. Mechanically anchor to substrate through termination bars unless shown otherwise.

3.8 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Adhere walkway products to substrate with self-adhesive splice tape (factory applied) according to roofing system manufacturer's written instructions.
 1. Do not continue walkways across cricket valleys. Hold walkways back from valleys as shown on the drawings to permit water to flow unimpeded.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may, at their option and expense, engage a qualified independent testing and inspecting agency to perform roof tests and inspections and to prepare test reports.
- B. Repair or remove and replace components of membrane roofing system where test results or inspections indicate that they do not comply with specified requirements.
- C. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- D. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit report to Architect.
 1. Notify Architect or Owner 48 hours in advance of date and time of inspection.

3.10 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove membrane roofing system that does not comply with requirements, repair substrates and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION

SECTION 076200

SHEET METAL FLASHING AND TRIM

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. Formed roof-drainage sheet metal fabrications.
2. Formed low-slope roof sheet metal fabrications.
3. Miscellaneous fabrications including:
 - a. Equipment support flashing.
 - b. Masonry flashing.
 - c. Exposed metal flashings (exterior).
 - d. Interior metal trim.

B. Related Sections:

1. Section 042000 "Unit Masonry" for stainless steel flashing installed in masonry assemblies.
2. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
3. Section 072726 "Fluid Applied Membrane Air and Water Resistive Barriers" for stainless steel flashing.
4. Section 075323 "EPDM Roofing" for installing sheet metal flashing and trim integral with membrane roofing.
5. Section 074213.23 "Metal Composite Material Wall Panels" for sheet metal flashing and trim integral with metal wall panels.
6. Section 077100 "Roof Specialties" for manufactured roof specialties not part of sheet metal flashing and trim.
7. Section 079200 "Joint Sealants" for sealants referenced in this section.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Review requirements for insurance and certificates if applicable.
5. Review sheet metal flashing observation and repair procedures after flashing installation.
6. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design Submittals (LEED): Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
 1. Include plans, elevations, sections, and attachment details.
 2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled Work.
 3. Include identification of material, thickness, weight, and finish for each item and location in Project.
 4. Include details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 5. Include details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 6. Include details of termination points and assemblies, including fixed points.
 7. Include details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
 8. Include details of roof-penetration flashing.
 9. Include details of special conditions.
 10. Include details of connections to adjoining work.
 11. Detail formed flashing and trim at a scale of not less than 3 inches per 12 inches.
- D. Samples for Color Selection and Verification of Material Thickness: For each type of sheet metal flashing, trim, and accessory indicated provide a minimum 4-inch by 6-inch sample with factory-applied color finishes.
- E. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.
- F. Warranty: Sample of special warranty.

1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.8 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 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 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies, including cleats, anchors, and fasteners, shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual: Architectural Metal Flashing, Condensation and Air Leakage Control, and Reroofing" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.

- B. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required with smooth, flat surface.
 - 1. Exposed Coil-Coated Finishes:
 - a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent polyvinylidene fluoride (PVDF) resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 2. Color: As selected by Architect from manufacturer's full range.
 - 3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
- C. Stainless Steel Sheet: ASTM A240/A240M, Type 304 dead soft, fully annealed; with smooth, flat surface.
 - 1. Finish: ASTM A480/A480M, No. 2D (dull, cold rolled).
- D. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- B. Slip Sheet: Rosen-sized building paper, 3-lb/100 sq. ft. minimum, rosin sized.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal.
 - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- C. Solder:
 - 1. For Stainless Steel: ASTM B32, Grade Sn60, with acid flux of type recommended by stainless steel sheet manufacturer.

- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2-inch-wide and 1/8 inch thick.
- E. Silicone Transition Sheet: Low modulus, pre-cured silicone rubber sheet for use sealing flashing transitions.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow, Dowsil Silicone Transition Strip.
 - b. GE Silicones, UST – Pre-Cured Silicone Transition Sheet.
- F. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- G. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- H. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- I. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
 - 2. Use lapped expansion joints only where indicated on Drawings.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal in accordance with cited sheet metal standard to provide for proper installation of elastomeric sealant.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

- F. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.
- G. Seams (Stainless Steel): Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
 - 1. Where indicated to be soldered, tin edges to be seamed, form seams, and solder.
- H. Seams (Aluminum with Coated Finish): Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
 - 1. Rivet joints where necessary for strength.
- I. Do not use graphite pencils to mark metal surfaces.

2.6 ROOF DRAINAGE SHEET METAL FABRICATIONS

- A. Downspouts: Fabricate rectangular downspouts complete with mitered elbows. Furnish with metal hangers, from same material as downspouts, and anchors.
 - 1. Fabricated Hanger Style: SMACNA figure designation 1.35 B.
 - 2. Fabricate from the following materials:
 - a. Aluminum: 0.032 inch thick.
 - b. All edges are to be hemmed.
- B. Parapet Scuppers: Fabricate scuppers of dimensions required with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof. Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch thick.
- C. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape indicated complete with outlet tubes, exterior flange trim, and built-in overflows.
 - 1. Fabricated conductor head style: SMACNA figure designation 1-25F.
 - 2. Fabricate from the following materials:
 - a. Aluminum .032 inch thick.
- D. Splash Pans: Fabricate from the following materials:
 - 1. Aluminum: 0.040 inch thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Base Flashing not Specified in Other Sections: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch.

- B. Counterflashing not Specified in Other Sections: Shop fabricate interior and exterior corners. Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch.
- C. Roof-Penetration Flashing not Specified in Other Sections: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch.
- D. Roof-Drain Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.016 inch.

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

- A. Equipment Support Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.019 inch.
- B. Unit Masonry Metal Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: 0.030 inch, unless noted otherwise.
- C. Base Metal Flashing under Exposed Metal Flashing or Drip:
 - 1. Aluminum: 032 inch thick.
 - 2. Finish: Two-Coat Fluoropolymer.
- D. Exterior Exposed Metal Flashing or Drip:
 - 1. Aluminum: 032 inch thick.
 - 2. Finish: Two-Coat Fluoropolymer.
 - 3. Provide hemmed drip.
- E. Interior Metal Trim:
 - 1. Cold Rolled Steel Sheet: .075 inch thick (14 Gage).
 - 2. Finish: Field prime and paint.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - a. Install sealant tape where indicated.
 - 2. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 3. Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement.
 - 4. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 5. Install continuous cleats where shown, with fasteners spaced not more than 12 inches o.c.
 - 6. Space individual cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - 7. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 - 8. Torch cutting of sheet metal flashing and trim is not permitted.
 - 9. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
 - 1. Coat back side of uncoated aluminum sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim.
 - 1. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection.
 - 2. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
 - 3. Use lapped expansion joints only where indicated on Drawings.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate substrates.
 - 1. For wood sheathing, nails shall not be less than 1-1/4 inches long and wood screws not less than 3/4 inches long.
 - 2. For metal stud, decking or other metal substrate, use sizes not less than recommended by fastener manufacturer to achieve maximum pull out resistance.
- E. Seal joints as shown and as required for watertight construction.

1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- F. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter.
1. Pretin edges of sheets with solder to width of 1-1/2 inches; however, reduce pretinning where pretinned surface would show in completed Work.
 2. Do not solder metallic-coated steel and aluminum sheet.
 3. Do not use torches for soldering.
 4. Heat surfaces to receive solder, and flow solder into joint.
 - a. Fill joint completely.
 - b. Completely remove flux and spatter from exposed surfaces.
 5. Stainless Steel Soldering:
 - a. Tin edges of uncoated sheets, using solder for stainless steel and acid flux.
 - b. Promptly remove acid-flux residue from metal after tinning and soldering.
 - c. Comply with solder manufacturer's recommended methods for cleaning and neutralization.
- G. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

3.3 ROOF DRAINAGE SYSTEM INSTALLATION

- A. General: Install sheet metal roof drainage items to produce complete roof drainage system according to SMACNA recommendations and as indicated. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Downspouts: Join sections with 1-1/2-inch telescoping joints.
1. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches o.c. in between.
 2. Provide elbows at base of downspout to direct water to splash pan.
 3. Connect downspouts to underground drainage system indicated.
- C. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in elastomeric sealant compatible with roofing membrane.
- D. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
1. Anchor scupper closure trim flange to exterior wall and seal with elastomeric sealant to scupper.
 2. Loosely lock front edge of scupper with conductor head.
- E. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch below scupper discharge.

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending a minimum of 4 inches over base flashing. Install stainless-steel draw band and tighten.
- C. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches over base flashing. Lap counterflashing joints a minimum of 4 inches and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant [interlocking folded seam or blind rivets and sealant] [anchor and washer at 36-inch centers].
- D. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant and clamp flashing to pipes that penetrate roof.

3.5 MISCELLANEOUS FLASHING INSTALLATION

- A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.
- B. Exposed Metal Flashing or Drip Splice (Silicone Sheet Flashing Boot Splice): Coordinate installation of exposed metal flashings and drips with installation of various openings; curtain wall, storefront, and louvers and other cladding system components.
 - 1. Install base metal flashing at location where splices occur at continuous runs of exposed metal flashing and drips. At openings, extend flashing under window or louver units a minimum of 1-inch inboard of the primary weather seal.
 - 2. Center silicone transition sheet at splice location on top of base metal flashing. Place silicone transition sheet in continuous bead of a compatible silicone or butyl sealant applied at all edges of the sheet.
 - 3. Exposed metal flashings or drips shall have ends meet at center of transition sheet. Leave 1/4-to-3/8-inch gap between metal flashing or drip ends. Place metal flashings or drips in two continuous ribbons of a compatible silicone or butyl sealant applied at all horizontal and vertical surfaces. Sealant ribbons shall be installed parallel to the gap between the metal flashings or drips.
 - 4. At claddings, where flashings or drips are used at the base of a wall or transition to another material such as roofing system membrane; provide positive drainage by lapping weather barriers or air & water-resistive barriers over the up-turned flashing or drip leg by using a compatible transition membrane.
- C. Interior Metal Trim: Install at jambs and head of openings where indicated on the drawings.
 - 1. Fabricate trim to profiles indicated.
 - 2. Install continuous trim with no seaming.
 - 3. Miter cut intersecting trim pieces.
 - 4. Prime and paint per Section 099123 Interior Painting, Water Based Epoxy Coating.

3.6 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.7 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean off excess sealants.
- C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- D. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 077100
ROOF 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. This Section includes the following manufactured roof specialties:

1. Copings.
2. Roof edge specialties.
3. Counterflashings and reglets.

- B. Related Sections include the following:

1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
2. Section 076200 "Sheet Metal Flashing and Trim" for custom- and site-fabricated sheet metal flashing and trim.
3. Section 079513.16 "Exterior Expansion Joint Cover Assemblies" for manufactured roof expansion-joint cover assemblies.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Manufacture and install manufactured roof specialties to resist thermally induced movement and exposure to weather without failing, rattling, leaking, and fastener disengagement.

- B. Manufacture and install copings and roof edge flashings that are certified by the manufacturer to meet the following performance design criteria per the current edition of ANSI/SPRI/FM 4435/ ES-1 Wind Design Standard for Edge Systems used with low slope roofing systems.

1. ANSI/SPRI/FM 4435/ES-1 Test Method RE-3 for Coping: The coping system shall be tested simultaneously on horizontal and vertical surfaces and shall exceed horizontal and vertical design wind pressure as calculated in accord with the ANSI/SPRI/FM 4435/ES-1 Test RE-3.
2. ANSI/SPRI/FM 4435/ES-1 Test Method RE-1 Test for Roof Edge Termination of Single-Ply Roofing Membranes: The fascia system shall be tested to secure the membrane to minimum of 100 lbs/ft in accord with the ANSI/SPRI/FM 4435/ES-1 Test Method RE-1.
3. ANSI/SPRI/FM 4435/ES-1 Test Method RE-2 Pull-Off Test for Fascia: The fascia system shall be tested in accord with the ANSI/SPRI/FM 4435/ES-1 Test Method RE-2.

- C. Thermal Movements: Provide manufactured roof specialties that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and

avoid shear stress as a result of thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

D. Water Infiltration: Provide manufactured roof specialties that do not allow water infiltration to building interior.

1.4 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Sustainable Design Submittals (LEED): Refer to Section 018113.14 and comply with requirements when applicable.

C. Shop Drawings: Show layouts of manufactured roof specialties, including plans and elevations. Identify factory- vs. field-assembled work. Include the following:

1. Details for fastening, joining, supporting, and anchoring manufactured roof specialties including fasteners, clips, cleats, and attachments to adjoining work.
2. Details for expansion and contraction.
3. Indicate location of expansion joints.
4. Indicate pattern of seams and layout of fasteners, cleats, clips and other attachments.
5. Include details of special conditions.

D. Samples for Color Selection and Verification of Material Thickness: For each type of manufactured roof specialty indicated provide a minimum 4 inch by 6 inch sample.

1.5 QUALITY ASSURANCE

A. 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 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.

B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section 075323 "EPDM Roofing".

1.6 COORDINATION

A. Coordinate installation of manufactured roof specialties with interfacing and adjoining construction to provide a leakproof, secure, and noncorrosive installation.

1.7 WARRANTY

- A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 075323 “EPDM Roofing”.
- B. Special Warranty on Painted Finishes: Manufacturer’s standard form in which manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Fluoropolymer 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 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Products: The designs for copings, roof edge flashings, counterflashings, and reglets are based on the manufacturers and products named. Provide the products listed that correspond with the approved roofing system.

2.2 EXPOSED METALS

- A. Aluminum Sheet (exposed): ASTM B 209, alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:
 - 1. Surface: Smooth, flat finish.
 - 2. High-Performance Organic Finish: Two-Coat Fluoropolymer.
- B. Aluminum Sheet (concealed): ASTM B 209, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- C. Aluminum Extrusions: ASTM B 221, alloy and temper recommended by manufacturer for type of use and structural performance indicated, mill finished.
- D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- E. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 coating designation; structural quality.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, separators, sealants, and other miscellaneous items required by manufacturer for a complete installation.

- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
- C. Sealing Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealing tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.
- F. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- G. Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- H. Slip Sheet: Rosin-sized paper, minimum 3 lb/100 sq. ft.

2.4 COPINGS

- A. Copings: Manufactured coping system consisting of formed-metal coping cap in section lengths not exceeding 12 feet, concealed anchorage, with concealed splice plates with same finish as coping caps, mitered corner units, and end cap units.
 - 1. Products: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle SynTec, Inc. – SecurEdge 200 Coping.
 - b. Firestone Building Products, Co. – Firestone Coping System.
 - c. Johns Manville, Inc. – Presto Lock Coping System.
 - 2. Coping Caps: Snap-on, fabricated from the following exposed metal:
 - a. Aluminum: 0.063 inch thick.
 - 3. Coping Cap Color: As selected by Architect from manufacturer's full range.
 - 4. Corners: Factory mitered continuously welded.
 - 5. Coping-Cap Attachment Method: Snap-on, fabricated from coping-cap material.
 - a. Snap-on Coping Anchor Plates: Concealed, galvanized steel sheet, 12 inches wide, by minimum 0.028-inch-thick, with integral cleats.

2.5 ROOF EDGE SPECIALTIES

- A. Roof Edge Fascia: Manufactured, two-piece, roof edge fascia consisting of snap-on metal fascia cover in section lengths not exceeding 12 feet and a continuous formed- or extruded-aluminum anchor bar with integral drip edge cleat to engage fascia cover. Provide matching mitered and welded corner units.
 - 1. Products: Subject to compliance with requirements, provide products by one of the following:
 - a. Carlisle SynTec, Inc. – SecurEdge 2000 Fascia.
 - b. Firestone Building Products, Co. – AnchorGuard SP Fascia.

- c. Johns Manville, Inc. – Presto-Tite Fascia System.
2. Fascia Cover: Fabricated from the following exposed metal:
 - a. Formed Aluminum: 0.050 inch thick.
3. Fascia Cover Color: As selected by Architect from manufacturer's full range.
4. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.

2.6 ROOF EDGE DRAINAGE SYSTEMS

- A. Parapet Scuppers: Manufactured scuppers with closure flange trim to exterior, 4-inch- wide wall flanges to interior, and base extending 4 inches beyond cant or tapered strip into field of roof.
 1. Fabricate parapet scuppers from the following exposed metal:
 - a. Aluminum: 0.050 inch thick.
 - b. Units to be welded not riveted.
 2. Product: Metal-Era Seal-Tite Thru-Wall Scuppers.
- B. Conductor Heads: Manufactured conductor heads with flanged back and stiffened top edge, of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout, and exterior flange trim.
 1. Fabricate conductor heads from the following exposed metal:
 - a. Aluminum: 0.0320 inch thick.
 - b. Units to be welded not riveted.
 2. Product: Metal-Era Seal-Tite Collector Boxes.

2.7 COUNTERFLASHINGS AND REGLETS

- A. Basis-of-Design Product:
 1. Subject to compliance with requirements, provide Metal-Era two-piece counterflashing or comparable products by one of the following:
 - a. Cheney Flashing Company.
 - b. Fry Reglet Corporation.
 - c. Hickman, W. P. Company.
 2. Products:
 - a. Two piece counterflashing thru wall CF THRUWALL-R.
- B. Counterflashings: Manufactured units of heights to overlap top edges of base flashing by 4 inches and in lengths not exceeding 12 feet designed to snap into reglets or thru wall flashing and compress against base flashings with joints lapped, from the following exposed metal in thickness indicated:
 1. Aluminum: 0.032 inch thick.

- C. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashings indicated with factory-mitered and -welded corners and junctions, from the following exposed metal in thickness indicated:
1. Stainless Steel: 0.030 inch thick.
 2. Types:
 - a. Reglet receiver with continuous bent leg for secure fit in masonry bed joint. No exposed fasteners.
 - b. Surface-mounted with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
 - c. Thru wall with horizontal leg of depth required to reach substrate with 1 inch minimum vertical leg at face of substrate.
- D. Accessories: Counterflashing wind-restraint clips. Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower end.

2.8 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Coil-Coated Aluminum Sheet Finishes:
1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - b. Concealed Surface Finish: Apply pretreatment and manufacturer's standard acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
 - c. The following listed finish colors correspond to wall cladding systems:
 - 1) Color: TBD – Will match Metal Composite Material Wall Panels.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of work.
1. Examine walls, roof edges, and parapets for suitable conditions for manufactured roof specialties.
 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install manufactured roof specialties according to manufacturer's written instructions. Anchor manufactured roof specialties securely in place and capable of resisting forces specified in performance requirements. Use fasteners, separators, sealants, and other miscellaneous items as required to complete manufactured roof specialty systems.
 - 1. Install manufactured roof specialties with provisions for thermal and structural movement.
 - 2. Torch cutting of manufactured roof specialties is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Coat concealed side of uncoated aluminum manufactured roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing exposed-to-view components of manufactured roof specialties directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet, or install a course of polyethylene underlayment.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.
- C. Install manufactured roof specialties level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil-canning, buckling, or tool marks.
- D. Install manufactured roof specialties to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
- E. Expansion Provisions: Provide for thermal expansion of exposed manufactured roof specialties. Space movement joints at a maximum of 12 feet with no unplanned joints within 18 inches of corners or intersections.
- F. Fasteners: Use fasteners of type and size recommended by manufacturer but of sizes that will penetrate substrate not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws.
- G. Seal joints with elastomeric sealant as required by manufacturer of roofing specialties.

3.3 COPING INSTALLATION

- A. Install cleats, anchor plates, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor copings to resist uplift and outward forces according to performance requirements.
 - 1. Interlock face and back leg drip edges of snap-on coping cap into cleated anchor plates anchored to substrate at manufacturer's recommended spacing.

3.4 ROOF EDGE FLASHING INSTALLATION

- A. Install cleats, cant dams, and other anchoring and attachment accessories and devices with concealed fasteners.
- B. Anchor roof edgings to resist uplift and outward forces according to performance requirements.

3.5 ROOF EDGE DRAINAGE SYSTEM INSTALLATION

- A. General: Install parapet scuppers and conductor heads to produce a complete roof drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof drainage system.
- B. Parapet Scuppers: Install scuppers where indicated through parapet. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
 - 1. Anchor scupper closure trim flange to exterior wall and seal or solder to scupper.
 - 2. Loosely lock front edge of scupper with conductor head.
- C. Conductor Heads: Anchor securely to wall with elevation of conductor head rim 1 inch below scupper discharge.

3.6 COUNTERFLASHING AND REGLET INSTALLATION

- A. Counterflashings: Coordinate installation of counterflashings with installation of base flashings. Insert counterflashings in reglets or receivers and fit tightly to base flashings. Extend counterflashings 4 inches over base flashings. Lap counterflashing joints a minimum of 4 inches and bed with elastomeric sealant.

3.7 CLEANING AND PROTECTION

- A. Clean and neutralize flux materials. Clean off excess solder and sealants.
- B. Remove temporary protective coverings and strippable films as manufactured roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain in a clean condition during construction.
- C. Replace manufactured roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 077200
ROOF 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. Roof hatches.

- B. Related Requirements:

- 1. Section 055000 "Metal Fabrications" for metal vertical ladders for access to roof hatches.
 - 2. Division 28 Sections for standard curbs specified with rooftop units.

1.3 COORDINATION

- A. Coordinate layout and installation of roof accessories with roofing membrane and base flashing and interfacing and adjoining construction to provide a leakproof, weathertight, secure, and noncorrosive installation.

- B. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

1.4 SUBMITTALS

- A. Product Data: For each type of roof accessory.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

- B. Shop Drawings: For roof accessories.

- 1. Include plans, elevations, keyed details, and attachments to other work. Indicate dimensions, loadings, and special conditions. Distinguish between plant- and field-assembled work.

- C. Coordination Drawings: Roof plans, drawn to scale, and coordinating penetrations and roof-mounted items. Show the following:

- 1. Size and location of roof accessories specified in this Section.
 - 2. Method of attaching roof accessories to roof or building structure.
 - 3. Other roof-mounted items including mechanical and electrical equipment, ductwork, piping, and conduit.

4. Required clearances.

D. Sample Warranties: For manufacturer's special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Operation and Maintenance Data: For roof accessories to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof accessories shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

2.2 ROOF HATCHES

A. Roof Hatches: Metal roof-hatch units with lids and insulated double-walled curbs, welded or mechanically fastened and sealed corner joints, continuous lid-to-curb counterflashing and weathertight perimeter gasketing, straight sides, and integrally formed deck-mounting flange at perimeter bottom.

1. Basis-of-Design Product: Subject to compliance with requirements, provide the Type TB Thermally Broken Roof Hatch by The Bilco Company or comparable products by one of the following:

a. Nystrom, Inc., ThermalMax RHT Roof Hatches.

B. Type and Size:

1. Roof Hatch for Ladder Access: Type S-50TB, Single-Leaf Lid, 36 by 30 inches.
2. Curb: 12-inch-high with integral metal cap flashing flange for roof membranes. 5 1/2-inch mounting flange at base.

C. Loads: Minimum 40-lbf/sq. ft. external live load and 20-lbf/sq. ft. internal uplift load.

D. Hatch Material: Aluminum sheet,

1. Thickness: 0.090 inch.
2. Finish: Mill

E. Construction:

1. Insulation: 3-inch-thick, Polyisocyanurate in lid and curb.
 - a. R-Value: R20 according to ASTM C1363.
2. Hatch Lid: Opaque, insulated, and double walled, with manufacturer's standard metal liner of same material and finish as outer metal lid.

3. Curb Liner: Manufacturer's standard, of same material and finish as metal curb.
4. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
5. Fabricate curbs to minimum height of 12 inches above roofing surface unless otherwise indicated.
6. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate curb with perimeter curb height that is tapered to accommodate roof slope so that top surfaces of perimeter curb are level. Equip hatch with water diverter or cricket on side that obstructs water flow.

F. Hardware:

1. Spring operator composite tube lifting mechanism.
2. Hold-open arm with 1-inch diameter red vinyl grip handle.
3. Stainless steel spring latch with interior and exterior turn handles,
4. Stainless steel butt- or pintle-type hinge system, and
5. Padlock hasps inside and outside.

G. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.

1. Product:

- a. Bilco Type S - Bil-Guard 2.0 Roof Hatch Railing System, Model RL2-S.

2. Height: 42 inches above finished roof deck.
3. Posts and Rails: Aluminum pipe. 6061 T6 Schedule 40, 1-1/4 inches in diameter.
4. Mounting Brackets: Extruded aluminum, 3/8 inches thick.
5. Maximum Opening Size: System constructed to prevent passage of a sphere 21 inches in diameter.
6. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard Type 316 stainless steel hinges and self-latching mechanism.
7. Post and Rail Tops and Ends: Weather resistant, closed or plugged with prefabricated end fittings.
8. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members.
9. Fabricate joints exposed to weather to be watertight.
10. Fasteners: Manufacturer's standard, Type 316 stainless steel.
11. Finish: Manufacturer's standard powder coat finish. Color safety yellow.

H. Ladder-Assist Post: Roof-hatch manufacturer's standard device for attachment to roof-access ladder.

1. Product: Bilco Ladder Up Safety Post, Model LU-1.
2. Operation: Post locks in place on full extension; release mechanism returns post to closed position.
3. Height: 42 inches above finished roof deck.
4. Post: Manufacturers standard steel tubing.
5. Mounting Hardware: All mounting hardware shall be Type 316 stainless steel.
6. Finish: Manufacturer's standard powder coat. Color safety yellow.

2.3 METAL MATERIALS

- A. Aluminum Sheet: ASTM B209, manufacturer's standard alloy for finish required, with temper to suit forming operations and performance required.

1. Mill Finish: As manufactured.
- B. Aluminum Extrusions and Tubes: ASTM B221 manufacturer's standard alloy and temper for type of use, finished to match assembly where used; otherwise mill finished.
- C. Stainless Steel Sheet and Shapes: ASTM A240/A240M or ASTM A666, Type 304 unless Type 316 is indicated.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, protective coatings, sealants, and other miscellaneous items required by manufacturer for a complete installation.
- B. Polyisocyanurate Board Insulation: ASTM C1289, thickness and thermal resistivity as indicated.
- C. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.
- D. Underlayment:
 1. Felt: ASTM D226/D226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
 2. Slip Sheet: Building paper, 3 lb/100 sq. ft. minimum, rosin sized.
 3. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.
- E. Fasteners: Roof accessory manufacturer's recommended fasteners suitable for application and metals being fastened. Match finish of exposed fasteners with finish of material being fastened. Provide nonremovable fastener heads to exterior exposed fasteners. Furnish the following unless otherwise indicated:
 1. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
- F. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, PVC, or silicone or a flat design of foam rubber, sponge neoprene, or cork.
- G. Elastomeric Sealant: ASTM C920, elastomeric polyurethane or silicone polymer sealant as recommended by roof accessory manufacturer for installation indicated; low modulus; of type, grade, class, and use classifications required to seal joints and remain watertight.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions, and other conditions affecting performance of the Work.
- B. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- C. Verify dimensions of roof openings for roof accessories.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions.
 - 1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.
 - 3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.
 - 4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.
- B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
 - 1. Coat concealed side of uncoated aluminum roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
 - 2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.
 - 3. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof accessories for waterproof performance.
- C. Roof-Hatch Installation:
 - 1. Verify that roof hatch operates properly. Clean, lubricate, and adjust operating mechanism and hardware.
 - 2. Attach safety railing system to roof-hatch curb.
 - 3. Attach ladder-assist post according to manufacturer's written instructions.
- D. Seal joints with elastomeric sealant as required by roof accessory manufacturer.

3.3 REPAIR AND CLEANING

- A. Clean exposed surfaces according to manufacturer's written instructions.
- B. Clean off excess sealants.

- C. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 078413

PENETRATION FIRESTOPPING

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. Penetrations in fire-resistance-rated walls.
- 2. Penetrations in horizontal assemblies.

- B. Related Requirements:

- 1. Section 078443 "Joint Firestopping" for joints in or between fire-resistance-rated construction, at exterior curtain-wall/floor intersections, and in smoke barriers.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

- A. Product Data: For each type of product.

- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

- C. Product Schedule: For each penetration firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.

- 1. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.

- a. Penetrations at non-rated floors are required to have Engineering Judgement systems if manufacturer does not have system designs/details for specific penetration conditions and locations.

- D. Qualification Data: For Installer.

- E. Product Test Reports: For each penetration firestopping system, for tests performed by a qualified testing agency.
- F. Installer Certificates: From Installer indicating that penetration firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- B. Installation Responsibility: Assign installation of through-penetration firestop systems in Project to a single qualified installer.
- C. Source Limitations: Obtain through-penetration firestop systems, for each kind of penetration and construction condition indicated, through one source from a single manufacturer.
 - 1. If the General Contractor or Construction Manager chooses to procure the installation of through-penetration firestop systems to be performed by multiple contractors or trades, then the General Contractor or Construction Manager shall coordinate with the multiple contractors or trades to ensure that the products used in the project are sourced from the same manufacturer.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install penetration firestopping system when ambient or substrate temperatures are outside limits permitted by penetration firestopping system manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.
- B. Install and cure penetration firestopping materials per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.
- C. Notify Owner's inspecting agency at least seven days in advance of through-penetration firestop system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up through-penetration firestop system installations that will become concealed behind other construction until each installation has been examined by Owner's inspecting agency and building inspector, if required by authorities having jurisdiction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."

2.2 PENETRATION FIRESTOPPING SYSTEMS

A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. Specified Technologies, Inc.
2. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
 - a. See drawings for UL Classified Penetration Firestopping Systems.

B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Nonfire-Resistive-Rated Horizontal Assemblies: Provide System Detail or Engineered Judgement by approved manufacturer's which can include the following:

1. Packing Material, mineral wool or other approved product.
2. Manufacturer's approved Smoke and Acoustic Sealant or Firestop Sealant.
3. CPVC piping, use manufacturer's approved materials.
4. Preformed Devices, manufacturer's approved products for bundled cables and other penetrating items.

D. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E84.

- E. Compatibility: Provide through-penetration firestop systems that are compatible with one another; with the substrates forming openings; and with the items, if any, penetrating through-penetration firestop systems, under conditions of service and application, as demonstrated by through-penetration firestop system manufacturer based on testing and field experience.
- F. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
 - 1. Permanent forming/damming/backing materials.
 - 2. Substrate primers.
 - 3. Collars.
 - 4. Steel sleeves.

2.3 FILL MATERIALS

- A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- C. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.
- D. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized-steel sheet.
- E. Intumescent Putties: Nonhardening, water-resistant, intumescent putties containing no solvents or inorganic fibers.
- F. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- G. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- H. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- I. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
- J. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

2.4 MIXING

- A. Penetration Firestopping Materials: For those products requiring mixing before application, comply with penetration firestopping system manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing penetration firestopping systems, clean out openings immediately to comply with manufacturer's written instructions and with the following requirements:
 - 1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping materials.
 - 2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install penetration firestopping systems to comply with manufacturer's written installation instructions and published drawings for products and applications.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings.
 - 1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestopping.
- C. Install fill materials by proven techniques to produce the following results:
 - 1. Fill voids and cavities formed by openings, forming materials, accessories and penetrating items to achieve required fire-resistance ratings.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

D. Where items penetrate nonfire-resistance-rated floor systems, install System Detail or Engineered Judgement per approved manufacturer's instructions:

1. When indicated fill annular spaces by friction fitting packing material, mineral wool or other approved product.
2. When indicated seal with manufacturer's approved Smoke and Acoustic Sealant or Firestop Sealant.
3. If penetrating item is CPVC piping, use manufacturer's approved system for this material.
4. Manufacturer's approved preformed devices for bundled cables and other penetrants may be used.

3.4 IDENTIFICATION

A. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections as required by the OBC [and as indicated on Schedule of Special Inspections] according to ASTM E2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping system manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping systems are without damage or deterioration at time of Substantial

Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove damaged or deteriorated penetration firestopping material and install new materials to produce systems complying with specified requirements.

END OF SECTION

SECTION 078443
JOINT FIRESTOPPING

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. Joints in or between fire-resistance-rated constructions.
- 2. Joints at exterior curtain-wall/floor intersections.

- B. Related Requirements:

- 1. Section 078413 "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.
- 2. Section 079513.13 "Interior Expansion Joint Cover Assemblies" for fire-resistive manufactured expansion-joint cover assemblies for interior floors, walls, and ceilings and exterior building walls, soffits, and parapets.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

- A. Product Data: For each type of product.

- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

- C. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

- 1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

- a. Exterior Curtain-Wall/Floor Intersections at non-rated floors are required to have Engineering Judgement systems for their specific condition and location.

- D. Qualification Data: For Installer.

- E. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.
- F. Installer Certificates: From Installer indicating that joint firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."
- B. Installation Responsibility: Assign installation of fire-resistive joint systems in Project to a single qualified installer.
- C. Source Limitations: Obtain joint firestopping systems, for each kind of joint and construction condition indicated, through one source from a single manufacturer.
 - 1. If the General Contractor or Construction Manager chooses to procure the installation of joint firestopping systems to be performed by multiple contractors or trades, then the General Contractor or Construction Manager shall coordinate with the multiple contractors or trades to ensure that the products used in the project are sourced from the same manufacturer.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install joint firestopping systems when ambient or substrate temperatures are outside limits permitted by joint firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure joint firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

- A. Coordinate construction of joints to ensure that joint firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate joint firestopping systems.
- C. Notify Owner's inspecting agency at least seven days in advance of fire-resistive joint system installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up fire-resistive joint system installations that will become concealed behind other construction until Owner's inspecting agency and building inspector of authorities having jurisdiction have examined each installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics:

1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
 - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
 - 1) UL in its "Fire Resistance Directory."

2.2 JOINT FIRESTOPPING SYSTEMS

A. Joint Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. 3M Fire Protection Products.
 - b. Hilti, Inc.
 - c. Specified Technologies, Inc.

B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E1966 or UL 2079.

1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
2. Refer to Drawings for UL assemblies and details.

C. Joints at Exterior Curtain-Wall/Floor Intersections:

1. Nonfire-Resistive-Rated Floors:
 - a. Provide joint systems by approved manufacturers.
 - 1) Manufacturer's System, or Engineered Judgement System for project specific conditions, that seals voids at intersection of curtain wall and nonfire-resistant-rated floor system.
 - 2) System to retard the interior spread of fire and hot gases between stories and meet approval of Authority Having Jurisdiction.

D. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E84.

- E. Compatibility: Provide fire-resistive joint systems that are compatible with joint substrates, under conditions of service and application, as demonstrated by fire-resistive joint system manufacturer based on testing and field experience.
- F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install elastomeric fill materials and to maintain ratings required. Use only components specified by joint firestopping system manufacturer and approved by the qualified testing agency for conditions indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning: Before installing fire-resistive joint systems, clean joints immediately to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:
 - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
 - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
 - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

3.3 INSTALLATION

- A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.
- B. Install forming materials and other accessories of types required to support elastomeric fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
 - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.
- C. Install elastomeric fill materials for fire-resistive joint systems by proven techniques to produce the following results:
 - 1. Elastomeric fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.

2. Apply elastomeric fill materials so they contact and adhere to substrates formed by joints.
3. For elastomeric fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 FIELD QUALITY CONTROL

- A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections as required by the OBC [and as indicated on Schedule of Special Inspections] and according to ASTM E2393.
- B. Where deficiencies are found or joint firestopping systems are damaged or removed due to testing, repair or replace joint firestopping systems so they comply with requirements.
- C. Proceed with enclosing joint firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

3.5 CLEANING AND PROTECTION

- A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping system manufacturers and that do not damage materials in which joints occur.
- B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION

SECTION 079200

JOINT SEALANTS

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. Silicone joint sealants.
2. Urethane joint sealants.
3. Mildew-resistant joint sealants.
4. Butyl joint sealants.
5. Latex joint sealants.
6. Acoustical joint sealants.

B. Related Sections:

1. Section 084413 "Glazed Aluminum Curtainwalls" for structural glazing sealant and other weatherseal sealants.
2. Section 088000 "Glazing" for glazing sealants.
3. Division 32 Section "Concrete Paving Joint Sealants" for sealing joints in pavements, walkways, and curbing.

1.3 PREINSTALLATION MEETING

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- D. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- E. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:
 - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each kind of sealant and joint substrate indicated.
 - 3. Notify Architect seven days in advance of dates and times when test joints will be erected.
 - a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.
 - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
 - 4. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
 - 5. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.7 FIELD CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty for Exterior Joints: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
 - 1. Warranty Period: five years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 100/50, Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. GE Construction Sealants; SCS2700 SilPruf LM.
 - b. Sika Corporation; Sikasil WS-290.

- c. Tremco Incorporated; Spectrem 1.

2.3 URETHANE JOINT SEALANTS

- A. Urethane, M, NS, 50, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability nontraffic-use, urethane joint sealant; ASTM C920, Type M, Grade NS, Class 50, Use NT.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Pecora Corporation; Dynatrol II.
 - b. Tremco Incorporated; Dymeric 240 FC.
- B. Urethane, M, NS, 25, T, NT: Multicomponent, nonsag or pourable, traffic and nontraffic-grade, urethane joint sealant: ASTM C 920, Type M, Grade NS or P, Class 25, for Use T.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corporation Construction Systems; MasterSeal NP2 or MasterSeal SL2.
 - b. Pecora Corporation; Dynatred or Dynatroll II SG.
 - c. Sika Corporation, Construction Products Division; Sikaflex - 2c NS.
 - d. Tremco Incorporated; Vulkem 116+catalyst or THC-901.

2.4 MILDEW-RESISTANT JOINT SEALANTS

- A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
- B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C920, Type S, Grade NS, Class 25, Use NT.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Omniplus.
 - b. Dow Corning Corporation; 786 Mildew Resistant.
 - c. GE Advanced Materials - Silicones; Sanitary SCS1700.
 - d. Tremco Incorporated; Tremsil 200 Sanitary.

2.5 BUTYL JOINT SEALANTS

- A. Butyl-Rubber-Based Joint Sealants: ASTM C1311.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bostik, Inc.; Chem-Calk 300.
 - b. Pecora Corporation; BC-158.
 - c. Tremco Incorporated: Tremco Butyl Sealant.

2.6 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Building Systems; Sonolac.
 - b. Pecora Corporation; AC-20+.
 - c. Sherwin Williams Company; 950A.
 - d. Tremco Incorporated; Tremflex 834.

2.7 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. OSI Sealants; Henkel Corporation; OSI Pro-Series SC-175 Acoustical Sound Sealant.
 - b. Pecora Corporation; AC-20 FTR.
 - c. Tremco Incorporated; Tremco Acoustical Sealant.
 - d. USG Corporation; SHEETROCK Acoustical Sealant.

2.8 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - d. Exterior insulation and finish systems.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Acoustical Sealant Installation: At sound-rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

3.4 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.5 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior and interior joints in horizontal traffic surfaces JS-1.
 - 1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Joints in paving units, including steps.
 - c. Tile flooring control and expansion joints.
 - d. Joints between different materials listed above.
 - e. Other joints as indicated.
 - 2. Joint Sealant: Urethane, M, NS, 25, T, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-2.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete(vertical).
 - b. Control and expansion joints in unit masonry.
 - c. Joints in dimension stone cladding.
 - d. Joints in glass unit masonry assemblies.
 - e. Joints between different materials listed above.
 - f. Other joints as indicated.
 - 2. Joint Sealant: Urethane, M, NS, 50, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- C. Joint-Sealant Application: Interior joints in vertical and horizontal nontraffic surfaces JS-3.
 - 1. Joint Locations:
 - a. Construction joints in cast-in-place concrete(vertical).
 - b. Control and expansion joints in unit masonry.
 - c. Control and expansion joints in wall tile.
 - d. Other joints as indicated.
 - 2. Joint Sealant: Urethane M, NS, 50, NT.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- D. Joint-Sealant Application: Exterior joints in vertical surfaces JS-4.
 - 1. Joint Locations:
 - a. Joints between metal wall panels.
 - b. Joints between materials listed above and adjacent materials.

- c. Perimeter joints between exterior cladding materials and frames of doors, windows, and louvers.
 - d. Other joints as indicated.
 2. Joint Sealant: Silicone, S, NS, 100/50, NT.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- E. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces JS-5.
 1. Joint Locations:
 - a. Where noted on the Drawings or called for in other sections.
 2. Joint Sealant: Butyl-Rubber Based.
- F. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces JS-6.
 1. Joint Locations:
 - a. Control joints on exposed interior surfaces of exterior walls.
 - b. Perimeter joints of exterior openings where indicated.
 - c. Perimeter joints between interior wall surfaces and frames of interior doors, windows, and elevator entrances.
 - d. Other joints as indicated.
 2. Joint Sealant: Acrylic Latex.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.
- G. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces JS-7.
 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - b. Plumbing fixture piping where it penetrates walls.
 - c. Countertop backsplashes where they meet countertops and walls.
 - d. Tile control and expansion joints where indicated.
 - e. Other joints as indicated.
 2. Joint Sealant: Mildew Resistant, Silicone, S, NS, 25, acid curing.
 3. Joint-Sealant Color: Clear/Translucent.
- H. Joint-Sealant Application: Interior acoustical joints in vertical surfaces and horizontal nontraffic surfaces JS-8.
 1. Joint Location:
 - a. Acoustical joints where indicated.
 - b. Other joints as indicated.
 2. Joint Sealant: Acoustical.
 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

END OF SECTION

SECTION 079513.13

INTERIOR EXPANSION JOINT COVER ASSEMBLIES

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 interior expansion joint cover assemblies.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.
- B. Shop Drawings: For each expansion joint cover assembly.
 - 1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
 - 2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
- C. Samples for Initial Selection: For each type of exposed finish.
 - 1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric-seal material.
- D. Expansion Joint Cover Assembly Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
 - 1. Manufacturer and model number for each expansion joint cover assembly.
 - 2. Expansion joint cover assembly location cross-referenced to Drawings.
 - 3. Nominal, minimum, and maximum joint width.
 - 4. Movement direction.
 - 5. Materials, colors, and finishes.
 - 6. Product options.
 - 7. Fire-resistance ratings.
- E. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by a qualified testing agency.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Furnish units in longest practicable lengths to minimize field splicing.
- B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E1966 by a qualified testing agency.
 - 1. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies shall be subjected to hose stream testing.
- C. Expansion Joint Design Criteria;
 - 1. Type of Movement: Thermal and wind sway.
 - a. Nominal Joint Width: As indicated on Drawings.
 - b. Minimum Joint Width: Per manufacturer's listed products.
 - c. Maximum Joint Width: Per manufacturer's listed products.
 - 2. Type of Movement: Seismic.
 - a. Joint Movement: As indicated on Drawings.

2.3 MANUFACTURERS

- A. Manufacturer/Products: Subject to compliance with requirements provide products by one of the following manufacturers:
 - 1. Balco, Inc. (Balco).
 - 2. Construction Specialties, Inc. (CS).
 - 3. MM Systems Corporation (MM).

2.4 FLOOR EXPANSION JOINT COVERS (Expansion Joint Systems)

- A. General: Unless noted otherwise, the following applies to all floor expansion joint cover systems:
 - 1. Load Capacity Minimums:
 - a. Uniform Load: 50 lb/sq. ft.
 - b. Concentrated Load: 300 lb.

- c. Maximum Deflection: 0.0625 inch.
 2. Fire-Resistance Rating: Not less than that indicated on Drawings.
 - B. Center-Plate Floor Joint Cover (FFJS-X): Assembly consisting of center plate that slides over metal frames fixed to sides of joint gaps.
 1. Manufacturer/Product:
 - a. Balco, NBR Series.
 - b. CS, SJPFR Series.
 - c. MM, LASB-NBR Series.
 2. Application: Floor to floor.
 3. Installation: Recessed.
 4. Cover-Plate Design: Recessed for floor finish.
 5. Exposed Metal:
 - a. Aluminum: Mill
- 2.5 WALL EXPANSION JOINT COVERS (Expansion Joint Systems)
- A. General: Unless noted otherwise, the following applies to all floor expansion joint cover systems:
 1. Fire-Resistance Rating: Not less than that indicated on Drawings.
 - B. Elastomeric-Seal Wall Joint Cover (WWJS-X): Assembly consisting of elastomeric seal anchored to flanged frames to be concealed by drywall taped and joint compound. For use at gypsum board wall systems.
 1. Manufacturer/Product:
 - a. Balco, GCWW Series.
 - b. CS, FWS Series.
 - c. MM, FSW Series.
 2. Application: Wall to wall.
 3. Exposed Metal:
 - a. Aluminum: Mill.
 4. Seal: Preformed elastomeric membranes or extrusions.
 - a. Color: Black.
 - C. Elastomeric-Seal Wall to Corner Joint Cover (WCJS-X): Assembly consisting of elastomeric seal anchored to frame fixed to side of joint gap one side and flanged frames to be concealed by drywall taped and joint compound at other side. For use at gypsum board wall systems.
 1. Manufacturer/Product:
 - a. Balco, GCWC Series.
 - b. CS, FWSC Series.

- c. MM, FSWL Series.
- 2. Application: Wall to corner.
- 3. Exposed Metal:
 - a. Aluminum: Mill.
- 4. Seal: Preformed elastomeric membranes or extrusions.
 - a. Color: Black.

2.6 CEILING EXPANSION JOINT COVERS (Expansion Joint Systems)

- A. Elastomeric-Seal Ceiling Joint Cover (CCJS-X): Assembly consisting of elastomeric seal anchored to flanged frames to be concealed by drywall taped and joint compound. For use at gypsum board ceiling systems.
 - 1. Application: Ceiling to ceiling.
 - 2. Same products as shown for similar gypsum board wall to wall assembly.
- B. Elastomeric-Seal Ceiling to Wall Joint Cover (CWJS-X): Assembly consisting of elastomeric seal anchored to frame fixed to side of joint gap at wall and flanged frame to be concealed by drywall taped and joint compound at ceiling side. For use at gypsum board ceiling systems.
 - 1. Application: Wall to ceiling.
 - 2. Same products as shown for similar gypsum board wall to corner assembly.

2.7 MATERIALS

- A. Aluminum: ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209, Alloy 6061-T6 for sheet and plate.
 - 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
- B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Fire Barriers (Expansion Joint Fire Barriers): Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.
 - 1. Provide fire barrier system from or approved by the expansion joint cover manufacturer.
 - 2. Fire barrier system to include required components to meet the expansion joints required fire resistance rating.
- D. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.
- E. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.8 ALUMINUM FINISHES

- A. Mill finish.
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2.9 ACCESSORIES

- A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.
 - 1. Provide at all horizontal joint assemblies and where indicated on Drawings.
- B. Manufacturer's stainless-steel attachment devices. Include anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces where expansion joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.
- B. Notify Architect where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
 - 1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
 - 2. Install frames in continuous contact with adjacent surfaces.
 - a. Shimming is not permitted.

3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
 5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- C. Elastomeric Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
1. Provide in continuous lengths for straight sections.
 2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- E. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.
- F. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.
- G. Moisture Barrier Drainage: Provide drainage fittings and connect to drains at all horizontal assemblies and where indicated.

3.4 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over expansion joint cover assemblies. Reinstall cover plates or seals prior to Substantial Completion.

END OF SECTION

SECTION 079513.16

EXTERIOR EXPANSION JOINT COVER ASSEMBLIES

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 exterior building expansion joint cover assemblies.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.
- B. Shop Drawings: For each expansion joint cover assembly.
 - 1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
 - 2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
- C. Samples for Initial Selection: For each type of exposed finish.
 - 1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric seal material.
- D. Expansion Joint Cover Assembly Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
 - 1. Manufacturer and model number for each expansion joint cover assembly.
 - 2. Expansion joint cover assembly location cross-referenced to Drawings.
 - 3. Nominal, minimum, and maximum joint width.
 - 4. Movement direction.
 - 5. Materials, colors, and finishes.
 - 6. Product options.
 - 7. Fire-resistance ratings.
- E. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by a qualified testing agency.

PART 2 - PRODUCTS

2.1 ASSEMBLY DESCRIPTION

- A. Furnish units in longest practicable lengths to minimize field splicing.
- B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Expansion joint cover assemblies shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E1966 by a qualified testing agency.
 - 1. Hose Stream Test: Wall-to-wall and wall-to-soffit assemblies shall be subjected to hose stream testing.
- C. Expansion Joint Design Criteria.
 - 1. Type of Movement: Thermal and wind sway.
 - a. Nominal Joint Width: As indicated on Drawings.
 - b. Minimum Joint Width: Per manufacturers products listed.
 - c. Maximum Joint Width: Per manufacturers products listed.
 - 2. Type of Movement: Seismic.
 - a. Joint Movement: Per manufacturers products listed.

2.3 MANUFACTURERS

- A. Manufacturer/Products: Subject to compliance with requirements provide products by one of the following manufacturers:
 - 1. Balco, Inc. (Balco).
 - 2. Construction Specialties, Inc. (CS).
 - 3. MM Systems Corporation (MM).

2.4 EXTERIOR EXPANSION JOINT COVERS (Expansion Joint Systems)

- A. Exterior Preformed Foam Joint Seal (EWWJS-X): Manufacturer's standard joint seal manufactured from urethane or EVA (ethylene vinyl acetate) foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths based on design criteria indicated, with factory- or field-applied adhesive for bonding to substrates.

1. Manufacturer/Product:
 - a. Balco, BCSW Series.
 - b. CS, VF Series.
 - c. MM, Color Joint-SIF Series.
2. Application: Wall to wall.
3. Installation: Recess-mounted.
4. Fire-Resistance Rating: Not less than that indicated on Drawings.
5. Joint Seal Color: As selected by Architect from manufacturer's full range.

2.5 MATERIALS

- A. Aluminum: ASTM B221, Alloy 6063-T5 for extrusions; ASTM B209, Alloy 6061-T6 for sheet and plate.
 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
- B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Fire Barriers (Expansion Joint Fire Barriers): Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.
 1. Provide fire barrier system from or approved by the expansion joint cover manufacturer.
 2. Fire barrier system to include required components to meet the expansion joints required fire resistance rating.
- D. Moisture Barrier (Expansion Joint Moisture Barrier): Manufacturer's standard, flexible elastomeric material.
- E. Roof Expansion Joint Backer Rod: Extruded cylindrical, foam backer rod for use at membrane roof expansion joints.
 1. ASTM C1330, Type C, closed cell, low density polyethylene foam material with a non-absorbent, moisture resistant surface skin.
 2. Sized 1-1/2 times the joint width it is placed over.

2.6 ALUMINUM FINISHES

- A. Mill finish.
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2.7 ACCESSORIES

- A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.

1. Manufacturers bellowed membrane with continues tabs that friction fit in joint assemblies with aluminum extrusions
 2. Manufacturers membrane that is to be attached to substrate on sides of joint.
 3. Provide at all exterior expansion joint cover assemblies.
 4. Provide manufacturer's prefabricated termination boot for installation at the bottom of vertical wall joint systems. Boot to be sized per the joint cover assembly's width and depth and sloped to allow water to drain out at the face of the wall.
- B. Manufacturer's standard aluminum or stainless-steel attachment devices. Include anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine surfaces where expansion joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.
- B. Notify Architect where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
 1. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
 2. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
 3. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
 4. Install frames in continuous contact with adjacent surfaces.
 - a. Shimming is not permitted.

5. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- C. Elastomeric Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
1. Provide in continuous lengths for straight sections.
 2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Preformed Foam Joint Seals: Install in compliance with manufacturer's written instructions. Install with minimum number of end joints.
1. Install each length of seal immediately after removing protective wrapping.
 2. Firmly secure compressed joint seals to joint gap side to obtain full bond using exposed pressure-sensitive adhesive or field-applied adhesive as recommended by manufacturer.
 3. Do not pull or stretch material. Produce seal continuity at splices, ends, turns, and intersections of joints.
 4. For applications at low ambient temperatures, heat foam joint seal material in compliance with manufacturer's written instructions.
- E. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- F. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.
- G. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.
- H. Moisture Barrier Drainage: If indicated, provide drainage fitting and connect to drains.

3.4 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections.

END OF SECTION

SECTION 081113

HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:

- 1. Interior standard steel doors and frames.
- 2. Exterior standard steel doors and frames.

- B. Related Requirements:

- 1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or ANSI/SDI A250.8.

- B. Definitions: The following are to aid in the use of this specification. Information is from Hollow Metal Manufacturing Association Tech Note HMMA 810 TN01-03.

- 1. Actual Door Height – The door opening height minus the top clearance and undercut.
- 2. Door Opening Height – The distance measured vertically between the frame head rabbet and top of floor or bottom of frame minus jamb extension.
- 3. Floor – The top of concrete or structural slab.
- 4. Floor Clearance – The distance between the bottom of the door and the top of the material below the door. This can be the concrete slab, any floor covering or a threshold.
- 5. Floor Covering – Any material applied on top of the floor that extends under the door in its closed position or under the door as it swings to its fully opened position.
- 6. Undercut – The distance between the bottom of the door and the bottom of the frame.
- 7. Jamb Extensions – The portion of a jamb or mullion which extends below the level of a floor.

1.4 COORDINATION

- A. Coordinate anchorage installation 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. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

1. Coordinate location of testing agency labels with hardware that will obscure them. Locate labels at top of door and head of frames when continuous hinges are used.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 SUBMITTALS

- A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, and finishes.

- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

- C. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.
7. Details of anchorages, joints, field splices, and connections.
8. Details of accessories.
9. Details of moldings, removable stops, and glazing.

- D. Product Schedule: For hollow-metal doors and frames, prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final door hardware schedule.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal doors and frames palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

- C. Store hollow-metal doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch- high wood blocking. Provide minimum 1/4-inch space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Ceco Door, Assa Abloy.
 2. Curries Company, Assa Abloy.
 3. Steelcraft, an Allegion brand.
 4. Republic Doors and Frames, an Allegion brand.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated on Drawings, based on testing at positive pressure according to NFPA 252 or UL 10C.
1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
 2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- B. Fire-Rated, Borrowed-Lite Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.
- C. Thermally Rated Door Assemblies: Provide door assemblies with U-factor of not more than 0.39 deg Btu/F x h x sq. ft. when tested according to ASTM C518 or ASTM C1363.

2.3 INTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 2; ANSI/SDI A250.4, Level B.
1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Uncoated Steel sheet, minimum thickness of 0.042 inch.
 - 1) Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch, at all stairs.
 - d. Edge Construction: Model 1, Full Flush.
 - e. Edge Bevel: Bevel lock and hinge edges 1/8 inch in 2 inches.
 - f. Core: Kraft-paper honeycomb.

- g. Fire-Rated Core: Manufacturer's standard laminated mineral board core for fire-rated and temperature-rise-rated doors.
- 2. Frames:
 - a. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch.
 - 1) Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, at doors indicated to have metallic-coated steel sheet.
 - b. Sidelite Frames: Fabricated from same thickness material as adjacent door frame.
 - c. Construction: Full profile welded at masonry wall locations.
- 3. Exposed Finish: Prime.

2.4 EXTERIOR STANDARD STEEL DOORS AND FRAMES

- A. Construct hollow-metal doors and frames to comply with standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- B. Extra-Heavy-Duty Doors and Frames: ANSI/SDI A250.8, Level 3; ANSI/SDI A250.4, Level A.

- 1. Doors:
 - a. Type: As indicated in the Door and Frame Schedule.
 - b. Thickness: 1-3/4 inches.
 - c. Face: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 (ZF120) coating.
 - d. Edge Construction: Model 1, Full Flush.
 - e. Edge Bevel: Bevel lock and hinge edges 1/8 inch in 2 inches.
 - f. Top Edge Closures: Close top edges of doors with flush closures of same material as face sheets. Seal joints against water penetration.
 - g. Bottom Edges: Close bottom edges of doors with end closures or channels of same material as face sheets. Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape.
 - h. Core: Polyurethane.
 - i. Fire-Rated Core: Manufacturer's standard core for fire-rated doors.
- 2. Frames:
 - a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch, with minimum A40 (ZF120) coating.
 - b. Construction: Full profile welded.
- 3. Exposed Finish: Prime.

2.5 BORROWED LITES

- A. Fabricate of uncoated steel sheet, minimum thickness of 0.042 inch.
- B. Construction: Knocked down Full profile welded.

- C. Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as metal as frames.
- D. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

2.6 HOLLOW-METAL PANELS

- A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

2.7 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Type: Anchors of minimum size and type required by applicable door and frame standard, and suitable for performance level indicated.
 - 2. Quantity: Minimum of three anchors per jamb, with one additional anchor for frames with no floor anchor. Provide one additional anchor for each 24 inches of frame height above 7 feet.
 - 3. Postinstalled Expansion Anchor: Minimum 3/8-inch-diameter bolts with expansion shields or inserts, with manufacturer's standard pipe spacer.
- B. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor.
- C. Floor Anchors for Concrete Slabs with Underlayment: Adjustable-type anchors with extension clips, allowing not less than 2-inch height adjustment. Terminate bottom of frames at top of underlayment.
- D. Material: ASTM A879/A879M, Commercial Steel (CS), 04Z coating designation; mill phosphatized.
 - 1. For anchors built into exterior walls, steel sheet complying with ASTM A1008/A1008M or ASTM A1011/A1011M; hot-dip galvanized according to ASTM A153/A153M, Class B.

2.8 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B.
- D. Inserts, Bolts, and Fasteners: hot-dip galvanized according to ASTM A153/A153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.
- F. Glazing: Comply with requirements in Section 088000 "Glazing."

2.9 FABRICATION

- A. Door Astragals: Provide overlapping astragal 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 or as required to comply with published listing of qualified testing agency.
- B. Hollow-Metal Frames: Fabricate in one piece except where handling and shipping limitations require multiple sections. Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of metal of same or greater thickness as frames.
 - 1. Sidelite and Transom Bar Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by welding.
 - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 3. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
 - b. Double-Door Frames: Drill stop in head jamb to receive two door silencers.
- C. Hardware Preparation: Factory prepare hollow-metal doors and frames to receive templated mortised hardware, and electrical wiring; include cutouts, reinforcement, mortising, drilling, and tapping according to ANSI/SDI A250.6, the Door Hardware Schedule, and templates.
 - 1. Reinforce doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.
 - 2. Comply with BHMA A156.115 for preparing hollow-metal doors and frames for hardware.
 - 3. Coordinate location of testing agency labels, for door and frame fire-resistance assemblies or smoke and draft control assemblies, with hardware that will obscure them.
 - a. Locate labels at top of door and head of frames when continuous hinges are used.
- D. Glazed Lites: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
 - 1. Provide stops and moldings flush with face of door, and with beveled stops unless otherwise indicated.
 - 2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.
 - 3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames. Provide loose stops and moldings on inside of hollow-metal doors and frames.
 - 4. Coordinate rabbet width between fixed and removable stops with glazing and installation types indicated.
 - 5. Provide stops for installation with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches o.c. and not more than 2 inches o.c. from each corner.

2.10 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.

1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

2.11 LOUVERS

- A. Provide louvers for interior doors, where indicated, which comply with SDI 111, with blades or baffles formed of 0.020-inch- thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame.
 1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.
- B. Form corners of moldings with hairline joints. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces. Touch up factory-applied finishes where spreaders are removed.
- B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.2 INSTALLATION

- A. Install hollow-metal doors and frames plumb, rigid, properly aligned, and securely fastened in place. Comply with approved Shop Drawings and with manufacturer's written instructions.
- B. Hollow-Metal Frames: Comply with ANSI/SDI A250.11.
 1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces without damage to completed Work.
 - a. Where frames are fabricated in sections, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces. Touch-up finishes.
 - b. Install frames with removable stops located on secure side of opening.
 2. Fire-Rated Openings: Install frames according to NFPA 80.
 3. Floor Anchors: Secure with postinstalled expansion anchors.
 - a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
 4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
 5. Installation Tolerances: Adjust hollow-metal frames to the following tolerances:

- a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- C. Examine installed door frames before hanging doors.
1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics.
 - a. Verify location of bottom of door frames in relation to top of floor structure to verify that required door bottom floor clearances can be achieved.
 - b. Verify that top of floor structure is uniform in height, across the door opening and the door swing area, so that required door bottom floor clearances can be achieved.
- D. Hollow-Metal Doors – Non-Fire-Rated Steel Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
1. Non-Fire-Rated Steel Doors: Comply with ANSI/SDI A250.8.
 2. Clearances:
 - a. Provide 1/8 inch to 3/16 inch at heads, jambs, and between pairs of doors.
 - b. Door undercuts from bottom of door to the bottom of the frame must be coordinated as follows:
 - 1) Verify various floor finish thicknesses when determining under-cut dimension to achieve specified clearance.
 - 2) Final clearance from bottom of door to floor finishes shall be 1/2 inch, plus or minus 1/4 inch.
 - 3) Where thresholds are indicated or scheduled, Clearance from bottom of door to top of threshold shall be coordinated to insure proper operation of door and seals.
- E. Hollow-Metal Doors - Fire-Rated and Smoke Control Doors: Fit and adjust hollow-metal doors accurately in frames, within clearances specified below.
1. Fire-Rated Doors: Install doors with clearances according to NFPA 80.
 2. Smoke-Control Doors: Install with clearances according to NFPA 105.
 3. Clearances:
 - a. Provide 1/8 inch plus or minus 1/16 inch at heads, jambs, and between pairs of doors.
 - b. Door undercuts from bottom of door to the bottom of the frame must be coordinated as follows:
 - 1) Verify various floor finish thicknesses when determining under-cut dimension to achieve specified clearance.
 - 2) Final clearance from bottom of door to floor finishes shall be 1/2 inch, plus or minus 1/8 inch.
 - a) Final clearance shall not exceed 3/4 inch per NFPA 80.
 - b) Where Floor Clearance exceeds 3/4 inch, doors must be replaced at no cost to the project.

- c) Where thresholds are indicated or scheduled, Clearance from bottom of door to top of threshold shall be coordinated to insure proper operation of door and seals.
- F. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

3.3 REPAIR

- A. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- B. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION

SECTION 081416
FLUSH WOOD DOORS

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. Five-ply flush wood veneer-faced doors for transparent finish.
2. Factory finishing flush wood doors.
3. Factory fitting flush wood doors to frames and factory machining for hardware.

- B. Related Requirements:

1. Section 088000 "Glazing" for glass view panels in flush wood doors.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

- A. Product Data: For each type of product, including the following:

1. Door core materials and construction.
2. Door edge construction
3. Door face type and characteristics.
4. Door louvers.
5. Factory-machining criteria.
6. Factory-finishing specifications.

- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

- C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each type of door; construction details not covered in Product Data; and the following:

1. Door schedule indicating door location, type, size, fire protection rating, and swing.
2. Door elevations, dimension and locations of hardware, lite and louver cutouts, and glazing thicknesses.
3. Details of electrical raceway and preparation for electrified hardware, access control systems, and security systems.

4. Dimensions and locations of blocking for hardware attachment.
5. Dimensions and locations of mortises and holes for hardware.
6. Clearances and undercuts.
7. Requirements for veneer matching.
8. Doors to be factory finished and application requirements.

D. Samples for Verification:

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches for each material and finish. For each wood species and transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.

E. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Special warranties.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.
- B. Package doors individually in plastic bags or cardboard cartons and wrap bundles of doors in plastic sheeting.
- C. Mark each door on top and bottom rail with opening number used on Shop Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until building is enclosed and weathertight, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F and relative humidity between 25 and 55 percent during remainder of construction period.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace doors that fail in materials or workmanship within specified warranty period.
1. Failures include, but are not limited to, the following:
 - a. Delamination of veneer.
 - b. Warping (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section.
 - c. Telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span.
 2. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors.
 3. Warranty Period for Solid-Core Interior Doors: Life of installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Wood Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated on Drawings, based on testing at positive pressure in accordance with NFPA 252.
1. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
- B. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing in accordance with UL 1784 and installed in compliance with NFPA 105.

2.3 FLUSH WOOD DOORS GENERAL

- A. Quality Standard: In addition to requirements specified, comply with AWI/AWMAC/WI's "Architectural Woodwork Standards."
1. When the Contract Documents contain requirements that are more stringent than the referenced quality standard, comply with the Contract Documents in addition to those of the referenced quality standard.
- B. Definitions: The following are to aid in the use of this specification. Information is from Hollow Metal Manufacturing Association Tech Note HMMA 810 TN01-03.
1. Actual Door Height – The door opening height minus the top clearance and undercut.
 2. Door Opening Height – The distance measured vertically between the frame head rabbet and top of floor or bottom of frame minus jamb extension.
 3. Floor – The top of concrete or structural slab.
 4. Floor Clearance – The distance between the bottom of the door and the top of the material below the door. This can be the concrete slab, any floor covering or a threshold.
 5. Floor Covering – Any material applied on top of the floor that extends under the door in its closed position or under the door as it swings to its fully opened position.
 6. Undercut – The distance between the bottom of the door and the bottom of the frame.
 7. Jamb Extensions – The portion of a jamb or mullion which extends below the level of a floor.

2.4 FIVE-PLY FLUSH WOOD VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Manufacturer/Products: Subject to compliance with requirements, provide one of the following Five-Ply Flush Wood Doors:
1. Cendura Series, Mohawk by Masonite Architectural.
 2. Aspiro Series, Marshfield – Algoma by Masonite Architectural.
 3. VT Heritage Collection, Architectural Wood Doors by VT Industries.

4. Architectural Flush Wood Doors by Oshkosh Door Company.

B. Interior Doors:

1. Architectural Woodwork Standards Grade: Custom (Grade A veneer faces).
2. Faces: Single-ply, wood veneer not less than 1/50 inch thick.
 - a. Species: Select white maple, all sapwood, no heartwood.
 - b. Cut: Plain sliced (flat sliced).
 - c. Match between Veneer Leaves: Book match.
 - d. Assembly of Veneer Leaves on Door Faces: Balance match.
 - e. Pair and Set Match: Provide for doors hung in same opening or separated only by mullions.
3. Exposed Vertical and Top Edges: Applied wood veneer edges of same species as faces and covering edges of faces - Architectural Woodwork Standards edge Type B.
 - a. Fire-Rated Single Doors: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed vertical edges.
 - b. Fire-Rated Pairs of Doors: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.
 - c. Mineral-Core Doors: At hinge stiles, provide laminated-edge construction with improved screw-holding capability and split resistance. Comply with specified requirements for exposed edges.
4. Core for Non-Fire-Rated Doors:
 - a. ANSI A208.1, Grade LD-2 particleboard.
 - b. Blocking: Provide WDMA I.S 10 structural composite lumber blocking in particleboard-core doors as follows:
 - 1) 5-inch top-rail blocking, in doors indicated to have closers and overhead stops.
 - 2) 5-inch midrail blocking, in doors indicated to have exit devices.
5. Core for Non-Fire-Rated Doors with Full Height Lights or Multiple Light Openings:
 - a. WDMA I.S. 10 structural composite lumber.
 - b. Provide at doors with full glass lights, divided or multiple glass lights or where required to maintain warranty with indicated cut-out openings.
6. Core for Fire-Rated Doors: As required to achieve fire-protection rating indicated on Drawings.
 - a. Blocking for Mineral-Core Doors: Provide composite blocking with improved screw-holding capability approved for use in doors of fire-protection ratings indicated on Drawings as follows:
 - 1) 5-inch top-rail blocking.
 - 2) 5-inch midrail blocking, in doors indicated to have exit devices.
7. Construction: Five plies, hot-pressed bonded (vertical and horizontal edging is bonded to core), with entire unit abrasive planed before veneering.

2.5 LIGHT FRAMES AND LOUVERS

- A. Wood Beads for Light Openings in Wood Doors: Provide manufacturer's standard wood beads unless otherwise indicated.
 - 1. Wood Species: Same species as door faces.
 - 2. Profile: Flush rectangular beads.
 - 3. At wood-core doors with 20-minute fire-protection ratings, provide wood beads and metal glazing clips approved for such use.
- B. Wood-Veneered Beads for Light Openings in Fire-Rated Doors: Manufacturer's standard wood-veneered noncombustible beads matching veneer species of door faces and approved for use in doors of fire-protection rating indicated on Drawings. Include concealed metal glazing clips where required for opening size and fire-protection rating indicated.
- C. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated on Drawings.

2.6 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated.
 - 1. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
 - 2. Comply with NFPA 80 requirements for fire-rated doors.
 - 3. Coordinate location of testing agency labels, for doors with fire-resistance assemblies or smoke and draft control assemblies, with hardware that will obscure them.
 - a. Locate labels at top of door when continuous hinges are used.
- B. Factory machine doors for hardware that is not surface applied.
 - 1. Locate hardware to comply with DHI-WDHS-3.
 - 2. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 - 3. Coordinate with hardware mortises in metal frames, to verify dimensions and alignment before factory machining.
 - 4. For doors scheduled to receive electrified locksets, provide factory-installed raceway and wiring to accommodate specified hardware.
 - 5. Metal Astragals: When scheduled factory machine astragals and formed-steel edges for hardware for pairs of fire-rated doors.
- C. Openings: Factory cut and trim openings through doors.
 - 1. Light Openings: Trim openings with moldings of material and profile indicated.
 - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Section 088000 "Glazing."
 - 3. Louvers: Factory install louvers in prepared openings.

2.7 FACTORY FINISHING

- A. Comply with referenced quality standard for factory finishing.

1. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 2. Finish faces, all four edges, edges of cutouts, and mortises.
 3. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
1. Architectural Woodwork Standards Grade: Custom.
 2. Finish: Architectural Woodwork Standards System-11, Polyurethane, Catalyzed.
 3. Staining: Match Architect's sample.
 4. Effect: Semifilled finish, produced by applying an additional finish coat to partially fill the wood pores.
 5. Sheen: Satin.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - a. Verify location of bottom of door frames in relation to top of floor structure to verify that required door bottom floor clearances can be achieved.
 - b. Verify that top of floor structure is uniform in height, across the door opening and the door swing area, so that required door bottom floor clearances can be achieved.
 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."
- B. Job-Fitted Doors, Non-Rated:
1. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 2. Align and fit doors in frames with uniform clearances and bevels as indicated below.
 - a. Do not trim stiles and rails in excess of limits set by manufacturer.
 3. Machine doors for hardware.
 4. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 5. Clearances:
 - a. Provide from 1/8 inch to 3/16 inch at heads, jambs, and between pairs of doors.

- b. Door undercuts from bottom of door to the bottom of the frame must be coordinated as follows:
 - 1) Verify various floor finish thicknesses when determining under-cut dimension to achieve specified floor clearance.
 - 2) Final floor clearance from bottom of door to floor finishes shall be 1/2 inch, plus or minus 1/4 inch.
 - 3) Where thresholds are indicated or scheduled, Clearance from bottom of door to top of threshold shall be coordinated to insure proper operation of door and seals.
- 6. Bevel non-fire-rated doors 1/8 inch in 2 inches at lock and hinge edges.
- C. Job-Fitted Doors, Fire-Rated and Smoke and Draft Control:
 - 1. Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
 - a. Install fire-rated doors and frames in accordance with NFPA 80.
 - b. Install smoke- and draft-control doors in accordance with NFPA 105.
 - 2. Align and fit doors in frames with uniform clearances and bevels as indicated below.
 - a. Do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors.
 - 3. Machine doors for hardware.
 - 4. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 5. Clearances:
 - a. Provide 1/8 inch at heads, jambs, and between pairs of doors.
 - 1) One Third Hour (20 minute) rated doors are permitted 1/8 inch plus or minus 1/16 inch at these locations.
 - b. Door undercuts from bottom of door to the bottom of the frame must be coordinated as follows:
 - 1) Verify various floor finish thicknesses when determining under-cut dimension to achieve specified floor clearance.
 - 2) Final floor clearance from bottom of door to floor finishes shall be 1/2 inch, plus or minus 1/8 inch.
 - a) Final floor clearance shall not exceed 3/4 inch per NFPA 80.
 - b) Where Floor Clearance exceeds 3/4 inch, doors must be replaced at no cost to the project.
 - c) Where thresholds are indicated or scheduled, Clearance from bottom of door to top of threshold shall be coordinated to insure proper operation of door and seals.
 - 6. Bevel fire-rated doors 1/8 inch in 2 inches at lock edge; trim stiles and rails only to extent permitted by labeling agency.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge per requirements listed for job-fitted doors.

- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION

SECTION 083113

ACCESS 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 access doors and frames for walls and ceilings.
- B. Related Requirements:
 - 1. Section 077200 "Roof Accessories" for roof hatches.
 - 2. Division 23 Section for heating and air-conditioning duct access doors.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, fire ratings, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Product Schedule: For access doors and frames including:
 - 1. Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.
 - 2. Use same designations indicated on Drawings.

1.4 CLOSEOUT SUBMITTALS

- A. Record Documents: For fire-rated doors, list of applicable room name and number in which access door is located.

1.5 QUALITY ASSURANCE

- A. Fire-Rated Door Inspector Qualifications: Inspector for field quality control inspections of fire-rated door assemblies shall meet the qualifications set forth in NFPA 80, section 5.2.3.1 and the following:
 - 1. Door and Hardware Institute Fire and Egress Door Assembly Inspector (FDAI) certification.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Access Doors and Frames: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection and temperature-rise limit ratings indicated, according to NFPA 252 or UL 10B.

2.2 ACCESS DOORS AND FRAMES

- A. Basis of Design Products: Products by Karp Associates, Inc. or comparable products by one of the following:

1. Milcor Inc.
2. Nystrom, Inc.

- B. Flush Access Doors with Exposed Flanges - AD-1:

1. Product: Karp No. DSC-214M.
2. Description: Face of door flush with frame, with exposed flange and concealed hinge.
3. Locations: Masonry and tile wall surfaces.
4. Door Size: 18 x 18 inches unless indicated otherwise.
5. Uncoated Steel Sheet for Door: Nominal 0.075 inch, 14 gage, factory primed.
6. Frame Material: Nominal 0.060 inch, 16 gage, factory primed.
7. Hinges: Pin type, spring loaded.
8. Latch and Lock: Cam latch, screwdriver operated with interior release.

- C. Flush Access Doors with Concealed Flanges - AD-2:

1. Product: Karp No. KDW.
2. Description: Face of door flush with frame; with concealed flange for gypsum board installation and concealed hinge.
3. Locations: Gypsum board wall and ceiling surfaces.
4. Door Size: 18 x 18 inches unless indicated otherwise.
5. Uncoated Steel Sheet for Door: Nominal 0.075 inch, 14 gage, factory primed.
6. Frame Material: Nominal 0.060 inch, 16 gage, factory primed.
7. Hinges: Pin type, spring loaded.
8. Latch and Lock: Cam latch, screwdriver operated with interior release.

- D. Recessed Access Doors with Concealed Flanges - AD-3:

1. Product: Karp No. RDW.
2. Description: Door face recessed 5/8 inch for gypsum board infill; with concealed flange for gypsum board installation and concealed hinge.
3. Locations: Gypsum board wall and ceiling surfaces.
4. Door Size: 18 x 18 inches unless indicated otherwise.
5. Uncoated Steel Sheet for Door: Nominal 0.075 inch, 14 gage, factory primed.
6. Frame Material: Nominal 0.060 inch, 16 gage, factory primed.
7. Hinges: Pin type, spring loaded.
8. Latch and Lock: Cam latch, screwdriver operated with interior release.

2.3 FIRE-RATED ACCESS DOORS AND FRAMES

A. Fire-Rated, Flush Access Doors with Exposed Flanges – AD-6.

1. Product: Karp: No. KRP-150FR.
2. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet metal; with exposed flange, self-closing door, and concealed hinge.
3. Locations: Masonry and tile wall surfaces.
4. Door Size: 18 x 18 inches unless indicated otherwise.
5. Fire-Resistance Rating: Not less than that of adjacent construction.
6. Temperature-Rise Rating: 250 deg F at the end of 30 minutes.
7. Uncoated Steel Sheet for Door: Nominal 0.036 inch 20 gage factory primed.
8. Frame Material: Nominal 0.060 inch, 16 gage, factory primed.
9. Latch and Lock: Self-latching door hardware, sliding bolt type, keyed paddle latch.

B. Fire-Rated, Flush Access Doors with Concealed Flanges –AD-7:

1. Product: Karp: No. KRP-350FR.
2. Description: Door face flush with frame, with a core of mineral-fiber insulation enclosed in sheet metal; with concealed flange for gypsum board installation, self-closing door, and concealed hinge.
3. Locations: Gypsum board wall and ceiling.
4. Door Size: 18 x 18 inches unless indicated otherwise.
5. Fire-Resistance Rating: Not less than that of adjacent construction.
6. Temperature-Rise Rating: 250 deg F at the end of 30 minutes.
7. Uncoated Steel Sheet for Door: Nominal 0.036 inch 20 gage factory primed.
8. Frame Material: Nominal 0.060 inch, 16 gage, factory primed.
9. Latch and Lock: Self-closing, self-latching door hardware, sliding bolt type, keyed paddle latch.

2.4 MATERIALS

- A. Steel Plates, Shapes, and Bars: ASTM A36/A36M.
- B. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A879/A879M, with cold-rolled steel sheet substrate complying with ASTM A1008/A1008M, Commercial Steel (CS), exposed.
- C. Metallic-Coated Steel Sheet: ASTM A653/A653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- D. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063.
- E. Frame Anchors: Same material as door face.
- F. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.5 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.

- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish mounting holes, attachment devices and fasteners of type required to secure access doors to types of supports indicated.
 - 1. For concealed flanges with drywall bead, provide edge trim for gypsum panels securely attached to perimeter of frames.
- D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling. Provide access sleeves for each latch operator and install in holes cut through finish.
 - 1. For recessed doors with plaster infill, provide self-furring expanded-metal lath attached to door panel.
- E. Latch and Lock Hardware:
 - 1. Quantity: Furnish number of latches and locks required to hold doors tightly closed.
 - 2. Keys: Furnish two keys per lock and key all locks alike.
- F. Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.6 FINISHES

- 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: 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.
- D. Painted Finishes: Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
 - 1. Factory Primed: Apply manufacturer's standard, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates 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

- A. Comply with manufacturer's written instructions for installing access doors and frames.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.

END OF SECTION

SECTION 083613
SECTIONAL DOORS

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. Sectional-door assemblies.

- B. Related Requirements:

- 1. Section 055000 "Metal Fabrications" for miscellaneous steel supports.

1.3 SUBMITTALS

- A. Product Data: For each type and size of sectional door and accessory.

- 1. Include construction details, material descriptions, dimensions of individual components, profile door sections, and finishes.
 - 2. For power-operated doors, include rated capacities, operating characteristics, electrical characteristics, and furnished accessories.

- B. Shop Drawings: For each installation and for components not dimensioned or detailed in manufacturer's product data.

- 1. Include plans, elevations, sections, and mounting details.
 - 2. Include details of equipment assemblies. Indicate dimensions, required clearances, method of field assembly, components, and location and size of each field connection.
 - 3. Include points of attachment and their corresponding static and dynamic loads imposed on structure.
 - 4. Include diagrams for power, signal, and control wiring.

- C. Samples: For each exposed product and for each color and texture specified, in manufacturer's standard size.

- D. Samples for Initial Selection: For units with factory-applied finishes.

- 1. Include Samples of accessories involving color selection.

- E. Qualification Data: For Installer.

- F. Sample Warranties: For manufacturer's warranty and finish warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sectional doors to include in maintenance manuals.
- B. Manufacturer's warranty.
- C. Finish warranty.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer for both installation and maintenance of units required for this Project.
- B. Regulatory Requirements: Comply with provisions in the U.S. Department of Transportation's "ADA Standards for Transportation Facilities" applicable to sectional doors.

1.6 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Faulty operation of hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use; rust through.
 - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Operator Warranty: Manufacturer agrees to repair or replace components of sectional doors that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of components or operators before reaching required number of operation cycles.
 - 2. Warranty Period: Three year from date of Substantial Completion or 20,000 cycles.
- C. Finish Warranty: Manufacturer agrees to repair or replace components that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS, GENERAL

- A. Source Limitations: Obtain sectional doors from single source from single manufacturer.

1. Obtain operators and controls from sectional door manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Provide sectional doors that comply with performance requirements specified without failure from defective manufacture, fabrication, installation, or other defects in construction and without requiring temporary installation of reinforcing components.
- B. Structural Performance, Exterior Doors: Capable of withstanding the design wind loads.
 1. Design Wind Load: Uniform pressure (velocity pressure) of 20 lbf/sq. ft. acting inward and outward.
 2. Testing: In accordance with ASTM E330.
 3. Deflection Limits: Design sectional doors to withstand design wind loads without evidencing permanent deformation or disengagement of door components.
 - a. Deflection of door sections in horizontal position (open) shall not exceed 1/120 of door width.
 - b. Deflection of horizontal track assembly shall not exceed 1/240 of door height.
- C. Seismic Performance: Provide sectional doors that withstand the effects of earthquake motions determined in accordance with ASCE/SEI 7.
 1. Component Importance Factor: 1.5.

2.3 SECTIONAL-DOOR ASSEMBLY

- A. Aluminum Sectional Door: Provide sectional door formed with hinged sections and fabricated so that finished door assembly is rigid and aligned with tight hairline joints; free of warp, twist, and deformation; and complies with requirements in DASMA 102.
 1. Basis of Design: Subject to compliance with requirements, provide Aluminum Door Systems Model 521 by Overhead Door Corporation or one of the comparable products:
 - a. Clopay Commercial, Models 902/903.
 - b. Wayne-Dalton Corp.; Models 451/452.
- B. Operation Cycles: Door components and operators capable of operating for not less than 10,000 operation cycles. One operation cycle is complete when door is opened from closed position to the open position and returned to closed position.
- C. Air Infiltration: Maximum rate of 0.4 cfm/sq. ft. when tested in accordance with ASTM E283 or DASMA 105.
- D. Aluminum Sections: ASTM B221 extruded-aluminum stile and rail members of alloy and temper standard with manufacturer for type of use and finish indicated; with rail and stile dimensions and profiles indicated on Drawings; and with overlapped or interlocked weather- and pinch-resistant seal at meeting rails.
 1. Door-Section Thickness: 1-3/4 inches.
 2. Section Reinforcing: Continuous horizontal and diagonal reinforcement as required to stiffen door and for wind loading. Ensure that reinforcement does not obstruct vision lites.

- a. Hardware Locations: Provide reinforcement for hardware attachment.
3. Insulated Stiles and Rails: Fill stiles and rails manufacturer's standard polyurethane expanding foam.
4. Glazed Panels: Manufacturer's standard, aluminum-framed section with glazing sealed with glazing tape and aluminum glazing bead. Glazing as follows:
 - a. Tempered Glass: 6 mm thick and complying with ASTM C1048, Kind FT (fully tempered), Condition A (uncoated), Type I, Class 1 (clear), Quality-Q3.
5. Solid Aluminum Panels: ASTM B209 alloy and temper standard with manufacturer for use and finish indicated.
 - a. Description: 0.050 inch thick.
 - b. Attachment to Frame: Sealed with glazing tape and aluminum glazing bead.
 - c. Aluminum Surface: Smooth.
- E. Track: Manufacturer's standard, galvanized-steel, standard-lift track system. Provide complete system including brackets, bracing, and reinforcement to ensure rigid support of ball-bearing roller guides.
 1. Material: Galvanized steel, ASTM A653/A653M, minimum G60 (Z180) zinc coating.
 2. Size: As recommended in writing by manufacturer for door size, weight, track configuration and door clearances indicated on Drawings.
 3. Track Reinforcement and Supports: Provide galvanized-steel members to support track without sag, sway, and vibration during opening and closing of doors. Slot vertical sections of track spaced 2 inches apart for door-drop safety device.
 - a. Vertical Track: Incline vertical track to ensure weathertight closure at jambs. Provide continuous angle attached to track and wall.
 - b. Horizontal Track: Provide continuous reinforcing angle from curve in track to end of track, attached to track and supported at points by laterally braced attachments to overhead structural members.
- F. Weatherseals: Replaceable, adjustable, continuous, compressible weather-stripping gaskets of flexible vinyl, rubber, or neoprene fitted to bottom top and jambs of door. Provide combination bottom weatherseal and sensor edge for bottom seal.
- G. Hardware: Heavy-duty, corrosion-resistant hardware, with hot-dip galvanized, stainless steel, or other corrosion-resistant fasteners, to suit door type.
 1. Hinges: Heavy-duty, galvanized-steel hinges of not less than 0.079-inch nominal coated thickness at each end stile and at each intermediate stile, in accordance with manufacturer's written recommendations for door size.
 - a. Attach hinges to door sections through stiles and rails with bolts and lock nuts or lock washers and nuts. Use rivets or self-tapping fasteners where access to nuts is impossible.
 - b. Provide double-end hinges where required for doors more than 16 ft. wide unless otherwise recommended by door manufacturer in writing.
 2. Rollers: Heavy-duty rollers with steel ball bearings in case-hardened steel races, mounted to suit slope of track. Extend roller shaft through both hinges where double hinges are required. Match roller-tire diameter to track width.

- a. Roller-Tire Material: Manufacturer's standard.
 3. Push/Pull Handles: Equip each door with galvanized-steel lifting handles on each side of door, finished to match door.
- H. Locking Device:
1. Slide Bolt: Fabricate with side-locking bolts to engage through slots in tracks for locking by padlock, located on single-jamb side, operable from inside only.
 2. Locking Device Assembly: Fabricate with cylinder lock, spring-loaded deadbolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.
 - a. Lock Cylinders: Cylinders complying with Section 087100 "Door Hardware" requirements.
 - b. Keying: Keyed to building keying system.
 - c. Keys: Three for each cylinder.
 3. Chain Lock Keeper: Suitable for padlock.
 4. Safety Interlock Switch: Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.
- I. Counterbalance Mechanism:
1. Torsion Spring: Adjustable-tension torsion springs complying with requirements of DASMA 102 for number of operation cycles indicated, mounted on torsion shaft.
 2. Cable Drums and Shaft for Doors: Cast-aluminum cable drums mounted on torsion shaft and grooved to receive door-lifting cables as door is raised.
 3. Cables: Galvanized-steel, multistrand, lifting cables with cable safety factor of at least 5 to 1.
 4. Cable Safety Device: Include a spring-loaded steel or bronze cam mounted to bottom door roller assembly on each side and designed to automatically stop door if lifting cable breaks.
 5. Bracket: Provide anchor support bracket as required to connect stationary end of spring to the wall and to level the shaft and prevent sag.
 6. Bumper: Provide spring bumper at each horizontal track to cushion door at end of opening operation.
- J. Electric Door Operator: Electric door operator assembly of size and capacity recommended by door manufacturer for door and operation cycles specified, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, control stations, control devices, integral gearing for locking door, and accessories required for proper operation.
1. Comply with NFPA 70.
 2. Control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6; with NFPA 70, Class 2 control circuit, maximum 24 V ac or dc.
 3. Safety: Listed in accordance with UL 325 by a qualified testing agency for commercial or industrial use; moving parts of operator enclosed or guarded if exposed and mounted at 8 ft. or lower.
 4. Usage Classification: Standard duty, up to 25 cycles per hour and up to 90 cycles per day.
 5. Operator Type: Jackshaft, side mounted.
 6. Motor: Reversible-type with controller (disconnect switch) for interior, clean, and dry motor exposure. Use adjustable motor-mounting bases for belt-driven operators.
 - a. Motor Size: As required to start, accelerate, and operate door in either direction from any position, at a speed not less than 8 in./sec. and not more than 12 in./sec. without exceeding nameplate ratings or service factor.

- b. Electrical Characteristics:
 - 1) Phase: Single phase.
 - 2) Volts: 115 V/230 V, to be verified.
 - 7. Limit Switches: Equip motorized door with adjustable switches interlocked with motor controls and set to automatically stop door at fully opened and fully closed positions.
 - 8. Obstruction Detection: Automatic external entrapment protection consisting of automatic safety sensor capable of protecting full width of door opening. Activation of device immediately stops and reverses downward door travel.
 - a. Monitored Entrapment Protection: Electric sensor edge on bottom section designed to interface with door-operator control circuit to detect damage to or disconnection of sensor and complying with requirements in UL 325.
 - 9. Control Station: Flush mounted, [three-position (open, close, and stop) control].
 - a. Operation: Push button interior and key exterior.
 - b. Interior-Mounted Unit: Full-guarded, surface-mounted, standard-duty, weatherproof-type, NEMA ICS 6, Type 4 enclosure.
 - 10. Emergency Manual Operation: Push-up type designed so required force for door operation does not exceed 25 lbf.
 - 11. Emergency Operation Disconnect Device: Hand-operated disconnect mechanism for automatically engaging manual operator and releasing brake for emergency manual operation while disconnecting motor without affecting timing of limit switch. Mount mechanism so it is accessible from floor level. Include interlock device to automatically prevent motor from operating when emergency operator is engaged.
 - 12. Motor Removal: Design operator so motor can be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.
- K. Metal Finish: Comply with NAAMM/NOMMA's "Metal Finishes Manual for Architectural and Metal Products (AMP 500-06)" for recommendations for applying and designating finishes.
- 1. Anodized Aluminum Finish: Noticeable variations in same piece are unacceptable. 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.
 - a. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrate construction and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install sectional doors and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; in accordance with manufacturer's written instructions.
- B. Tracks:
 - 1. Fasten vertical track assembly to opening jambs and framing with fasteners spaced not more than 24 inches apart.
 - 2. Hang horizontal track assembly from structural overhead framing with angles or channel hangers attached to framing by welding or bolting, or both. Provide sway bracing, diagonal bracing, and reinforcement as required for rigid installation of track and door-operating equipment.
- C. Accessibility: Install sectional doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.
- D. Power-Operated Doors: Install in accordance with UL 325.

3.3 STARTUP SERVICES

- A. Engage a factory-authorized service representative to perform startup service.
 - 1. Complete installation and startup checks in accordance with manufacturer's written instructions.
 - 2. Test and adjust controls and safety devices. Replace damaged and malfunctioning controls and equipment.

3.4 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that doors operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.
- C. Adjust doors and seals to provide weather-resistant fit around entire perimeter.
- D. Touchup Painting Galvanized Material: Immediately after welding galvanized materials, clean welds and abraded galvanized surfaces and repair galvanizing to comply with ASTM A780/A780M.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain sectional doors.

END OF SECTION

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 and interior storefront framing.
- 2. Exterior and interior manual-swing entrance doors and door-frame units.

- B. Related Requirements:

- 1. Section 087100 "Door Hardware" for Entrance Door Hardware.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

- B. Sustainable Design Submittals (LEED): Refer to Section 018113.14 and comply with requirements when applicable.

- C. Shop Drawings: For aluminum-framed 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 type of 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.
4. Include point-to-point wiring diagrams showing the following:
 - a. Power requirements for each electrically operated door hardware.
 - b. Location and types of switches, signal device, conduit sizes, and number and size of wires.

- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

- E. 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.

- F. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

- G. Qualification Data: For Installer and the following:
 1. For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the state in which Project is located.

- H. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
 1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.

- I. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.

- J. Manufacturer's installation instructions for each system specified.

- K. Sample Warranties: For special warranties.

- L. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

- 1.5 QUALITY ASSURANCE
 - A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

 - B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.6 MOCKUPS

- A. Mockups: Refer to Division 01 Section “Mock Ups” for requirements.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall 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.

1.7 WARRANTY

- A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures, including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 - 2. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E 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, peeling, or chipping.
 - 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design aluminum-framed entrances and storefronts.
- B. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
 - 1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure, including, but not limited to, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
 - 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- C. Structural Loads:
 - 1. Wind Loads: As indicated on Drawings.
 - 2. Other Design Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:
 - 1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans of up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch whichever is less.
 - 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
- E. Structural: Test according to ASTM E 330/E 330M as follows:
 - 1. When tested at positive and negative wind-load design pressures, storefront assemblies, including entrance doors, do not evidence deflection exceeding specified limits.
 - 2. When tested at 150 percent of positive and negative wind-load design pressures, storefront assemblies, including entrance doors and anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
 - 3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. 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. at a static-air-pressure differential of 6.24 lbf/sq. ft.
 - 2. Entrance Doors:

- a. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
- G. 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, including entrance doors, when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft.
- H. Seismic Performance: Aluminum-framed 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 as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas as a system shall have U-factor of not more than 0.36 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
 2. Solar Heat Gain Coefficient (SHGC): Fixed glazing and framing areas as a system shall have SHGC of no greater than those shown in Division 08 'Glazing' as determined according to NFRC 200.
 3. Condensation Resistance: Fixed glazing and framing areas as a system shall have an NFRC-certified condensation resistance rating of no less than 69 for both glass (1" insulated with low-e coating) and framing as determined according to NFRC 500.
- J. Noise Reduction: Test according to ASTM E 90, with ratings determined by ASTM E 1332, as follows.
1. Outdoor-Indoor Transmission Class: Minimum 26.
- K. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
1. Temperature Change: 120 deg F ambient; 180 deg F material surfaces.
 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
 - b. Low Exterior Ambient-Air Temperature: 0 deg F.
 - c. Interior Ambient-Air Temperature: 75 deg F.

2.3 STOREFRONT SYSTEMS

- A. Basis-of-Design Product for Exterior Storefront System: Subject to compliance with requirements, provide Trifab 601UT by Kawneer North America; an Arconic company or comparable product by one of the following:
1. Series 6000 XT; Oldcastle Building Envelope.
 2. YES 60 XT High Performance Storefront; by YKK AP America.
 3. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - a. Exterior Framing Construction: Thermally broken, 2 inches by 6-inch.
 - b. Glazing System: Retained mechanically with gaskets on four sides.
 - c. Glazing Plane: Center.

- d. Finish: Clear anodic finish.
 - e. Fabrication Method: Screw spline system.
 - f. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - g. Steel Reinforcement: As required by manufacturer.
- B. Basis-of-Design Product for Interior Storefront System: Subject to compliance with requirements, provide Trifab VG 450 by Kawneer North America; an Arconic company or comparable product by one of the following:
- 1. Series FG – 2000 Flush Glazed; Oldcastle Building Envelope.
 - 2. YES 45 FS; by YKK AP America.
 - 3. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
 - a. Interior Vestibule Framing Construction: Nonthermal, 1-3/4 inch by 4-1/2 inch.
 - b. Glazing System: Retained mechanically with gaskets on four sides.
 - c. Glazing Plane: Center.
 - d. Finish: Clear anodic finish.
 - e. Fabrication Method: Screw spline system.
 - f. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
 - g. Steel Reinforcement: As required by manufacturer.
- C. Extruded Framing Components and Trim: Fabricate from extruded aluminum, profiles as indicated on the drawings. Finish to match curtain wall system.
- 1. Sill Flashing: Exterior storefront system framing to have manufacturers thermally broken sill flashing with vertical leg at interior and which weeps water to the exterior. Provide end dam covers.
 - 2. Jamb and Head Backer Plates: The backside of jamb and head framing abutting adjacent construction, if not integral to the framing, is to have extruded aluminum closing off the framing.
 - a. Exterior storefront system framing to have manufacturers thermal break in backer plates.
 - 3. Interior Stool Trim: Minimum 0.080-inch aluminum.
- D. Formed Cover Trim: Fabricate from aluminum sheet or plate, profiles as indicated on the drawings. Finish to match curtain wall system.
- 1. 90 degree Outside and Inside Corners: 0.125-inch aluminum.
 - 2. Splay Outside and Inside Corner Trim: 0.125-inch aluminum.
 - 3. Exterior Special Trim: Minimum 0.080-inch aluminum.
 - 4. Interior Special Trim: Minimum 0.080-inch aluminum.
- E. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- F. Snap in or fastened aluminum caps, or plastic caps to seal off open extrusions at the concealed top and bottom of vertical mullions.

2.4 ENTRANCE DOOR SYSTEMS

- A. Basis-of-Design Product for Exterior Storefront Door System: Subject to compliance with requirements, provide AA 425 Thermal Entrance by Kawneer North America; an Arconic company or comparable product by one of the following:
1. Thermal Clad Entrance Door Model MS375 TC by Oldcastle Building Envelope.
 2. Megatherm Entrance Door Model 50XT; by YKK AP America.
 3. Door Construction: 2-1/4-inch overall thickness, with minimum 0.125-inch 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.
 - a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
 4. Door Design: Wide stile; 4-1/4-inch vertical, 4-1/4-inch top rail and 10-inch bottom rail.
 5. Glazing Stops and Gaskets: Square snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.
- B. Basis-of-Design Product for Interior Storefront Door System: Subject to compliance with requirements, provide 350 Swing Door by Kawneer North America; an Arconic company or comparable product by one of the following:
1. Series 375-Medium Stile by Oldcastle Building Envelope.
 2. Standard Medium Stile Entrances 35D by YKK AP America.
 3. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-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.
 4. Door Design: Medium stile; 3-1/2-inch vertical, 3-1/2-inch top rail and 10 inch bottom rail.
 5. Glazing Stops and Gaskets: Square snap-on, extruded-aluminum stops and preformed gaskets.
 - a. Provide nonremovable glazing stops on outside of door.

2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "Door Hardware."
- B. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
- C. Weather Stripping: Manufacturer's standard replaceable components.
1. Compression Type: Made of ASTM D 2000 molded neoprene or ASTM D 2287 molded PVC.
 2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

2.6 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Spandrel Glazing: As specified in Division 08 Section "Glazing."
- C. Spandrel Backpan: Galvanized steel backpan, 20 gauge, behind insulated glass unit and spandrel insulation.
 - 1. Provide continuous steel angle stiffeners at backpan per designated UL Assembly.
 - 2. Sealant used at spandrel backpan perimeter to be Butyl-Rubber-Based-Sealant per ASTM 1311.
- D. Spandrel Insulation: Mineral-Wool Board Insulation, Type III, Unfaced. ASTM C612, Type III; passing ASTM E136 for combustion characteristics.
 - 1. Product: Subject to compliance with requirements provide one of the following:
 - a. Roxul CurtainRock 80.
 - b. Thermafiber Firespan 90
 - 2. Nominal Density: 8 lb/cu. ft.
 - 3. R Value: 4.2 hr. ft²F/Btu per inch.
 - 4. Spandrel Insulation Thickness:
 - a. 3 inch at CW typical.
 - 5. Flame-Spread Index: Not more than 15 when tested in accordance with ASTM E84.
 - 6. Smoke-Developed Index: Not more than zero when tested in accordance with ASTM E84.
 - 7. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.

2.7 MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209.
- B. Aluminum Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 6063-T6 alloy and temper.
 - 1. Extrusions shall not have less than 0.070 inch wall thickness at any location for the main framing.
- ~~C. Aluminum Extruded Structural Pipe and Tubes: ASTM B 429.~~
- D. Aluminum Structural Profiles: ASTM B 308.
- E. Steel Reinforcement:
 - 1. Structural Shapes, Plates, and Bars: ASTM A 36.
 - 2. Cold-Rolled Sheet and Strip: ASTM A 1008.
 - 3. Hot-Rolled Sheet and Strip: ASTM A 1011.
 - 4. Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

2.8 ACCESSORIES

- A. Automatic Door Operators: Section 087113 "Automatic Door Operators."
- B. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 2. Reinforce members as required to receive fastener threads.
 - 3. Use exposed fasteners with countersunk Phillips screw heads, fabricated from 300 series stainless steel and finished to match framing system.
- C. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
 - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- D. Concealed Flashing: Dead-soft, 0.018-inch-thick stainless steel, complying with ASTM A 240/A 240M, of type recommended by manufacturer.
- E. Storefront Aluminum Sheet Flashing: ASTM B209, fabricate from 0.063-inch aluminum, profiles as indicated on the drawings. Provide flashing with the following color finishes per their locations:
 - 1. Sill Locations: Aluminum Sheet Flashing extending out from storefront system over top of sill construction.
 - a. Match metal color to TBD.
 - 2. Jamb Locations: Aluminum Sheet Flashing extending out from storefront system for closure at wall openings.
 - a. Match metal color to TBD.
- F. Framing Sealant: Storefront Manufacturer's recommended silicone sealant meeting requirements of ASTM C 920, Type S; Grade NS; Class 50; Uses NT, G, A, and O, AAMA 802.3 Type II, AAMA 803.
- G. Bituminous Paint: Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.
- H. Rigid PVC Filler.

2.9 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
7. The top and bottom of vertical framing extrusions are closed off with aluminum caps where they are open at head and sill locations. Seal or weld to make watertight.
 - a. Closing off these extrusions allows sealant and joint filler to be placed continuously along horizontal and vertical head and sill framing transitions.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Exterior Storefront Framing: Fabricate components for assembly using screw-spline system.

F. Interior Storefront Framing: Fabricate components for assembly using stick framed system.

G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At interior and exterior doors, provide compression weather stripping at fixed stops.

H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

I. 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.

J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.10 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

1. Product: Kawneer Permanodic, No. 14 Clear.

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 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, applying sealant or tape to 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.
3. Shims to be non-metallic.

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.

3.3 INSTALLATION OF GLAZING

A. Install glazing as specified in Section 088000 "Glazing."

3.4 INSTALLATION OF ALUMINUM-FRAMED ENTRANCE DOORS

A. 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.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.5 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
 - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch; wide, limit offset from true alignment to 1/8 inch.

- c. Where surfaces are separated by reveal or protruding element of 1 inch; wide or more, limit offset from true alignment to 1/4 inch.
- 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections.
- B. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.

END OF SECTION

SECTION 084413

GLAZED ALUMINUM CURTAIN WALLS

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. Conventionally glazed aluminum curtain walls.

- B. Related Requirements:

- 1. Section 078443 "Joint Firestopping" perimeter fire-containment systems (safing insulation) field installed with glazed aluminum curtain walls.
- 2. Section 079200 "Joint Sealants" for installation of joint sealants installed with glazed aluminum curtain walls and for sealants to the extent not specified in this Section.
- 3. Section 084113 "Aluminum-Framed Entrances and Storefronts" for other glazed framing systems and for Entrance Door Systems installed in Curtain Walls.
- 4. Section 088000 "Glazing" for curtain wall glazing.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

- B. Sustainable Design Submittals (LEED): Refer to Section 018113.14 and comply with requirements when applicable.

- C. Shop Drawings: For glazed aluminum curtain walls. 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 type of vertical-to-horizontal intersection of glazed aluminum curtain walls, 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.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Delegated-Design Submittal: For glazed aluminum curtain walls, indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- F. Qualification Data:
1. For Installer.
 2. For professional engineer's experience with providing delegated-design engineering services of the kind indicated, including documentation that engineer is licensed in the state in which Project is located.
- G. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.
1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.
- H. Product Test Reports: For glazed aluminum curtain walls, for tests performed by a qualified testing agency.
- I. Manufacturer's installation instructions for each system specified.
- J. Sample Warranties: For special warranties.
- 1.5 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For glazed aluminum curtain walls 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.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.7 MOCKUPS

- A. Mockups: Refer to Division 01 Section "Mock Ups" for requirements.
- B. Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall 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 WARRANTY

- A. Special Assembly Warranty: Installer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration created by wind and thermal and structural movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Water penetration through fixed glazing and framing areas.
 - e. Failure of operating components.
 - 2. Warranty Period: Five years from date of Substantial Completion.
- B. Special Finish Warranty, Anodized Finishes: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of anodized finishes within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E 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, peeling, or chipping.
 - 2. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazed aluminum curtain walls.

- B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
1. Glazed aluminum curtain walls 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.
 2. Failure also includes the following:
 - a. Thermal stresses transferring to building structure.
 - b. Glass breakage.
 - c. Noise or vibration created by wind and thermal and structural movements.
 - d. Loosening or weakening of fasteners, attachments, and other components.
 - e. Failure of operating units.
- C. Structural Loads:
1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
- D. Deflection of Framing Members: At design wind pressure, as follows:
1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans of up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans of greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
 2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
- E. Structural: Test according to ASTM E 330/E 330M 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.
- F. 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. at a static-air-pressure differential of 6.24 lbf/sq. ft.
- G. 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 15 lbf/sq. ft.
- H. 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 15 lbf/sq. ft.
 2. Maximum Water Leakage: According to AAMA 501.1, No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters or water that is drained to exterior.
- I. Interstory Drift: Accommodate design displacement of adjacent stories indicated.
1. Design Displacement: As indicated on Drawings.
 2. Test Performance: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.4 at design displacement and 1.5 times the design displacement.
- J. Seismic Performance: Glazed aluminum curtain walls shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
1. Seismic Drift Causing Glass Fallout: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.6 at design displacement and 1.5 times the design displacement.
 2. Vertical Interstory Movement: Complying with criteria for passing based on building occupancy type when tested according to AAMA 501.7 at design displacement and 1.5 times the design displacement.
- K. Energy Performance: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas as a system shall have U-factor of not more than 0.36 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
 2. Solar Heat Gain Coefficient (SHGC): Fixed glazing and framing areas as a system shall have a SHGC of no greater than those shown in Division 08 'Glazing' as determined according to NFRC 200.
 3. Condensation Resistance: Fixed glazing and framing areas as a system shall have an NFRC-certified condensation resistance rating of no less than 76 for glass (1" insulated with low-e coating) and 79 for framing as determined according to NFRC 500.
- L. Noise Reduction: Test according to ASTM E 90, with ratings determined by ASTM E 1332, as follows:
1. Outdoor-Indoor Transmission Class (OITC): Minimum 25 based on 1" insulated glazing units.
 2. Sound Transmission Class (STC): Minimum 33 based on 1" insulated glazing units.
- M. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
 2. Thermal Cycling: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
 - a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F.
 - b. Low Exterior Ambient-Air Temperature: 0 deg F.

2.2 SOURCE LIMITATIONS

- A. Obtain all components of curtain-wall system and storefront system, including framing entrances and accessories, from single manufacturer.

2.3 GLAZED ALUMINUM CURTAIN WALL SYSTEMS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide 1600UT System 1 curtain wall system by Kawneer North America; an Alcoa company or the following:

- 1. Reliance TC Type II; Oldcastle, Inc.
- 2. YCW 750 XT Aluminum Curtain Wall Systems; by YKK AP America.

- B. 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, 2-1/2 inch by 7-1/2 inch.
- 2. Glazing System: Retained mechanically with gaskets on four sides.
- 3. Glazing Plane: Front.
- 4. Finish: Clear anodic finish.
- 5. Fabrication Method: Stick system.
- 6. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
- 7. Steel Reinforcement: As required by manufacturer.

- C. Pressure Plates: Manufacturer's standard aluminum or fiberglass components that mechanically retain glazing.

- D. Mullion Trim Caps: Manufacturers extruded snap-on aluminum face caps that cover pressure plates and fasteners.

- 1. Standard Mullion Face Caps: 2-1/2 inch by 1/2 inch.
 - a. Manufacturers standard thickness.
- 2. Extended Mullion Caps: 2-1/2 inch by depths show on the Drawings.
 - a. Provide closures at exposed end conditions of extended face cap.
 - b. Manufacturers standard thickness, not less than 0.080-inch.

- E. Extruded Framing Components and Trim: Fabricate from extruded aluminum, profiles as indicated on the drawings. Finish to match curtain wall system.

- 1. Sill Flashing: Manufacturers thermally broken front sill flashing extrusion. Manufacturers standard thickness.
- 2. Jamb and Head Backer Plates: The backside of jamb and head framing abutting adjacent construction, if not integral to the framing, is to have extruded aluminum closing off the framing.
- 3. Interior Stool Trim: Minimum 0.080-inch aluminum.

- F. Formed Cover Trim: Fabricate from aluminum sheet or plate, profiles as indicated on the drawings. Finish to match curtain wall system.

- 1. 90 degree Outside and Inside Corners: 0.125-inch aluminum.

2. Splay Outside and Inside Corner Trim: 0.125-inch aluminum.
 3. Exterior Special Trim: Minimum 0.080-inch aluminum.
 4. Interior Special Trim: Minimum 0.080-inch aluminum.
- G. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- H. Snap in or fastened aluminum caps, or plastic caps to seal off open extrusions at the concealed top and bottom of vertical mullions.
- I. Entrance Door Systems: Comply with Section 084113 "Aluminum-Framed Entrances and Storefronts" Section 084213 "Aluminum-Framed Entrances".

2.4 MATERIALS

- A. Aluminum Sheet and Plate: ASTM B 209.
- B. Aluminum Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221, 6063-T6 alloy and temper.
1. Extrusions shall not have less than 0.070 inch wall thickness at any location for the main framing.
- C. Aluminum Extruded Structural Pipe and Tubes: ASTM B 429.
- D. Aluminum Structural Profiles: ASTM B 308.
- E. Steel Reinforcement:
1. Structural Shapes, Plates, and Bars: ASTM A 36
 2. Cold-Rolled Sheet and Strip: ASTM A 1008.
 3. Hot-Rolled Sheet and Strip: ASTM A 1011.
- F. Steel Reinforcement Primer: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.

2.5 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Spandrel Glazing: As specified in Division 08 Section "Glazing."
- C. Spandrel Backpan: Galvanized steel backpan, 20 gauge, behind insulated glass unit and spandrel insulation.
1. Provide continuous steel angle stiffeners at backpan per designated UL Assembly.
 2. Sealant used at spandrel backpan perimeter to be Butyl-Rubber-Based-Sealant per ASTM 1311.
- D. Spandrel Insulation: Mineral-Wool Board Insulation, Type III, Unfaced. ASTM C612, Type III; passing ASTM E136 for combustion characteristics.

1. Product: Subject to compliance with requirements provide one of the following:
 - a. Roxul CurtainRock 80.
 - b. Thermafiber Firespan 90
 2. Nominal Density: 8 lb/cu. ft.
 3. R Value: 4.2 hr. ft²F/Btu per inch.
 4. Spandrel Insulation Thickness:
 - a. 3 inch at CW typical.
 5. Flame-Spread Index: Not more than 15 when tested in accordance with ASTM E84.
 6. Smoke-Developed Index: Not more than zero when tested in accordance with ASTM E84.
 7. Labeling: Provide identification of mark indicating R-value of each piece of insulation 12 inches and wider in width.
- E. Glazing Gaskets: ASTM C 509 or ASTM C 864. Manufacturer's standard Compression-type, replaceable EPDM or extruded silicone complying with Section 088000 "Glazing."
1. Color: Black.
- F. Glazing Sealants: As recommended by manufacturer and complying with Section 088000 "Glazing."

2.6 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 2. Reinforce members as required to receive fastener threads.
 3. Use ~~exposed~~ fasteners with countersunk Phillips screw heads, fabricated from ~~300 series~~ stainless steel and finished to match framing system.
 - a. Any exposed fasteners or fasteners in wet or potentially wet areas of the wall shall be 300 series (austenitic) stainless steel.
 4. Stainless steel fasteners that are 400 series (martensitic) shall not be used with aluminum or aluminum alloys, no exceptions. Finish exposed fasteners to match adjacent aluminum.
 5. Exposed fasteners may only be used when shown on the shop drawings, noted as being exposed and approved by the Architect. The work shall be designed to conceal all fasteners.
 6. Unexposed fasteners in dry areas shall be cadmium and colored chromate plated and shall meet Federal Specification QQ-P-416E, Type II, Class #1 (.0005 inches thick plating).
 7. All non-stainless fasteners being used in a structural application must meet the minimum requirements of SAE J429 Grade 5.
 - a. Grade 5.0 (high strength bolts) of non U.S. origin shall not be used.
 - b. Grade 8 or higher bolts are not allowed.
 - c. Mill test reports for all structural grade bolts shall be submitted to the Architect for review prior to installation of those bolts on the project.
 8. Self-drilling fasteners may be permitted at the Architect's and Consultants discretion.

- a. If used, they must be Dril-Flex (special alloy steel) or Bi-Flex (300 series stainless steel) as manufactured by Elco Industries, Inc.
 - b. No other substitutions will be considered unless submitted, reviewed and approved in advance of their use on the project.
9. Nuts used at expansion or moving connections shall be designed to provide a positive means of preventing disengagement,
- a. Slotted and movement connections are to use lock nuts such as nylon-insert lock nuts by Nylok.
10. Staking of bolts, deforming of bolt threads or use of lock washers is not acceptable.
11. Use matched bolts, nuts, washers at all friction connections.
- B. Anchors:** Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing:** Dead-soft, 0.018-inch- thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.
- D. Curtain Wall Aluminum Sheet Flashing:** ASTM B209, fabricate from 0.063-inch aluminum, profiles as indicated on the drawings. Provide flashing with the following color finishes per their locations:
1. Sill Locations: Aluminum Sheet Flashing extending out from curtain wall system over top of sill construction.
 - a. Match metal color TBD.
 2. Jamb Locations: Aluminum Sheet Flashing extending out from curtain wall system for closure at wall openings.
 - a. Match metal color TBD.
- E. Framing Sealant:** Curtain Wall Manufacturer's recommended silicone sealant meeting requirements of ASTM C 920, Type S; Grade NS; Class 50; Uses NT, G, A, and O, AAMA 802.3 Type II, AAMA 803.
- F. Bituminous Paint:** Cold-applied asphalt-mastic paint containing no asbestos, formulated for 30-mil thickness per coat.

2.7 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
 1. Profiles that are sharp, straight, and free of defects or deformations.

2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
7. Components curved to indicated radii.
8. The top and bottom of vertical framing extrusions are closed off with aluminum caps where they are open at head and sill locations. Seal or weld to make watertight.
 - a. Closing off these extrusions allows sealant and joint filler to be placed continuously along horizontal and vertical head and sill framing transitions.

D. Fabricate components to resist water penetration as follows:

1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
2. Pressure-equalized system or double barrier design with primary air and vapor barrier at interior side of glazed aluminum curtain wall and secondary seal weeped and vented to exterior.

E. Curtain-Wall Framing: Fabricate components for assembly using shear-block system following manufacturer's standard installation instructions.

F. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES

A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

1. Product: Kawneer Permanodic, No. 14 Clear.

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 INSTALLATION, GENERAL

- A. Comply with manufacturer's written instructions.
- B. Do not install damaged components.
- C. Fit joints to produce hairline joints free of burrs and distortion.

- D. Rigidly secure nonmovement joints.
- E. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
- F. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
- G. Seal joints watertight unless otherwise indicated.
- H. Metal Protection:
 - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
 - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- I. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- J. Install components plumb and true in alignment with established lines and grades.

3.3 INSTALLATION OF GLAZING

- A. Install glazing as specified in Section 088000 "Glazing."

3.4 INSTALLATION OF SPANDREL GLAZING INSULATION

- A. Install board insulation in curtain-wall construction according to curtain-wall manufacturer's written instructions.
 - 1. Hold insulation in place by securing metal clips and straps or integral pockets within window frames, spaced at intervals recommended in writing by insulation manufacturer to hold insulation securely in place without touching spandrel glass.
 - 2. Maintain cavity width of dimension indicated on Drawings between insulation and glass.
 - 3. Install insulation to fit snugly without bowing.
 - 4. Tape seams between insulation boards and at perimeter where insulation boards meet curtain wall framing.
 - 5. Provide continuous bead of Butyl-Rubber-Based-Sealant around the perimeter of steel backpan and angles when they are utilized.

3.5 ERECTION TOLERANCES

- A. Install glazed aluminum curtain walls to comply with the following maximum tolerances:
 - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
 - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
 - 3. Alignment:
 - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.

- b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
 - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

3.6 FIELD QUALITY CONTROL

- A. Testing Agency: Owner may engage a qualified testing agency to perform tests and inspections.
- B. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.

END OF SECTION

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 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:

- 1. Commercial door hardware for the following:
 - a. Swinging doors.
 - b. Other doors to the extent indicated.
- 2. Cylinders for doors specified in other Sections.
- 3. Electrified door hardware.

- B. Related Sections include the following:

- 1. Section 081113 "Hollow Metal Doors and Frames" for door silencers provided as part of hollow-metal frames.
- 2. Section 081416 "Flush Wood Doors" for integral intumescent seals provided as part of fire-rated labeled assemblies.
- 3. Section 087113 "Automatic Door Operators" for door operators for swinging doors.
- 4. Division 26 Sections for connections to electrical power system and for low-voltage wiring work.
- 5. Division 28 Section "Access Control" for access control devices installed at door openings and provided as part of a security access system.
- 6. Division 28 Section "Intrusion Detection" for detection devices installed at door openings and provided as part of an intrusion detection system.
- 7. Division 28 Section "Fire Detection and Alarm" for connections to building fire alarm system.

1.3 COORDINATION

- A. Templates: Distribute door hardware templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, security system and building control system.

- C. Existing Openings: Where new hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide for proper operation.

1.4 SUBMITTALS

- A. Product Data: Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Details of electrified door hardware, indicating the following:
 - 1. Wiring Diagrams: Power, signal, and control wiring. Include the following:
 - a. System schematic.
 - b. Point-to-point wiring diagram.
 - c. Riser diagram.
 - d. Elevation of each door.
 - 2. Detail interface between electrified door hardware and fire alarm, access control, security, building control system.
 - 3. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.
- C. Door Hardware Sets: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final door hardware sets with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - 1. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - 2. Content: Include the following information:
 - a. Identification number, location, hand, fire rating, and material of each door and frame.
 - b. Type, style, function, size, quantity, and finish of each door hardware item. Include description and function of each lockset and exit device.
 - c. Complete designations of every item required for each door or opening including name and manufacturer.
 - d. Fastenings and other pertinent information.
 - e. Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule.
 - f. Explanation of abbreviations, symbols, and codes contained in schedule.
 - g. Mounting locations for door hardware.
 - h. Door and frame sizes and materials.
 - i. Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
 - a) Sequence of Operation: Include description of component functions that occur in the following situations: authorized person wants to enter; authorized person wants to exit; unauthorized person wants to enter; unauthorized person wants to exit.
 - j. List of related door devices specified in other Sections for each door and frame.

3. Submittal Sequence: Submit the final door hardware sets at earliest possible date, particularly where approval of the door hardware sets must precede fabrication of other work that is critical in 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 sets.
 4. Keying Schedule: Prepared by or under the supervision of Installer's Architectural Hardware Consultant, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations.
- D. Product Certificates: For electrified door hardware, signed by product manufacturer.
1. Certify that door hardware approved for use on types and sizes of labeled fire doors complies with listed fire door assemblies.
- E. Qualification Data: For Installer and Architectural Hardware Consultant.
- F. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware schedule.
- G. Warranty: Special warranty specified in this Section.
- 1.5 MAINTENANCE MATERIAL SUBMITTALS
- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- 1.6 QUALITY ASSURANCE
- A. Installer Qualifications: An employer of workers trained and approved by lock manufacturer.
1. Installer's responsibilities include supplying and installing door hardware and providing a qualified Architectural Hardware Consultant available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
 2. Installer shall have warehousing facilities in Project's vicinity.
 3. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 4. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Architectural Hardware Consultant Qualifications: A person who is currently certified by DHI as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
1. Electrified Door Hardware Consultant Qualifications: A qualified Architectural Hardware Consultant who is experienced in providing consulting services for electrified door hardware installations.
- C. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to electrified door hardware including, but not limited to, the following:

1. Inspect and discuss electrical roughing-in and other preparatory work performed by other trades.
2. Review sequence of operation for each type of electrified door hardware.
3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Review required testing, inspecting, and certifying procedures.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- B. Tag each item or package separately with identification related to the final door hardware sets, and include basic installation instructions, templates, and necessary fasteners with each item or package.

1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of operators and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
 2. Warranty Period: One year from date of Substantial Completion, except as follows:
 - a. Exit Devices: Two years from date of Substantial Completion.
 - b. Manual Closers: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type and variety of door hardware from single manufacturer, unless otherwise indicated.
 1. Provide electrified door hardware from same manufacturer as mechanical door hardware unless otherwise indicated. Manufacturers that perform electrical modifications and that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction are acceptable.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Door Assemblies: Where fire-rated doors are indicated, provide door hardware complying with NFPA 80 that is listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.

1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.
- B. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that complies with requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
 1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. at the tested pressure differential of 0.3-inch wg. of water.
- C. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- D. Means of Egress Doors: Latches do not require more than 15 lbf to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- E. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the DOJ's "2010 ADA Standards for Accessible Design".
 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf.
 2. Comply with the following maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf applied perpendicular to door.
 - b. Sliding or Folding Doors: 5 lbf applied parallel to door at latch.
 - c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
 3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch high.
 4. Adjust door closer sweep periods so that, from an open position of 90 degrees, the door will take at least 5 seconds to move to a position of 12 degrees from the latch.
 5. Adjust spring hinges so that, from an open position of 70 degrees, the door will take at least 1.5 seconds to move to the closed position.

2.3 SCHEDULED DOOR HARDWARE

- A. General: Provide door hardware for each door to comply with requirements in this Section and door hardware sets indicated in Part 3 "Door Hardware Sets" Article.
 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and named manufacturers' products.
 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
- B. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Door Hardware Sets" Article. Products are identified by using door hardware designations, as follows:
 1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Door Hardware Sets" Article.

- C. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 - 2. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers specified.

2.4 HINGES, GENERAL

- A. Quantity: Provide the following, unless otherwise indicated:
 - 1. Two Hinges: For doors with heights up to 60 inches.
 - 2. Three Hinges: For doors with heights 61 to 90 inches.
 - 3. Four Hinges: For doors with heights 91 to 120 inches.
 - 4. 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.
- B. Template Requirements: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.
- C. Hinge Weight: Unless otherwise indicated, provide the following:
 - 1. Entrance Doors: Heavy-weight hinges.
 - 2. Doors with Closers: Antifriction-bearing hinges.
 - 3. Interior Doors: Standard-weight hinges.
- D. Hinge Base Metal: Unless otherwise indicated, provide the following:
 - 1. Exterior Hinges: Stainless steel, with stainless-steel pin.
 - 2. Interior Hinges: , Steel, with steel pin.
 - 3. Hinges for Fire-Rated Assemblies: Stainless steel, with stainless-steel pin.
- E. Hinge Options: Where indicated in door hardware sets or on Drawings:
 - 1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while door is closed; for outswinging exterior doors and outswinging corridor doors with locks.
 - 2. Corners: Square.
- F. Electrified Functions for Hinges: Comply with the following:
 - 1. Power Transfer: Concealed PTFE-jacketed wires, secured at each leaf and continuous through hinge knuckle.
 - 2. Monitoring: Concealed electrical monitoring switch.
 - 3. Power Transfer and Monitoring: Concealed PTFE-jacketed wires, secured at each leaf and continuous through hinge knuckle, and with concealed electrical monitoring switch.
- G. Fasteners: Comply with the following:
 - 1. Machine Screws: For metal doors and frames. Install into drilled and tapped holes.
 - 2. Wood Screws: For wood doors and frames.
 - 3. Threaded-to-the-Head Wood Screws: For fire-rated wood doors.

4. Screws: Phillips flat-head. Finish screw heads to match surface of hinges.

2.5 HINGES

- A. Butts and Hinges: BHMA A156.1. Listed under Category A in BHMA's "Certified Product Directory."
- B. Template Hinge Dimensions: BHMA A156.7.
- C. Manufacturers:
 1. Hager Companies (HA).
 2. McKinney Products Company; an ASSA ABLOY Group company (MC).
 3. Stanley Commercial Hardware; Div. of Stanley Security Solutions (ST).

2.6 CONTINUOUS HINGES

- A. Standard: BHMA A156.26.
- B. General: Minimum 0.120-inch- thick, hinge leaves with minimum overall width of 4 inches; fabricated to full height of door and frame and to template screw locations; with components finished after milling and drilling are complete.
- C. Continuous, Gear-Type Hinges: Extruded-aluminum, pinless, geared hinge leaves; joined by a continuous extruded-aluminum channel cap; with concealed, self-lubricating thrust bearings.
 1. Manufacturers:
 - a. Hager Companies (HA).
 - b. McKinney Products Company; an ASSA ABLOY Group company (MC).
 - c. Pemko Manufacturing Co. (PE).
 - d. Stanley Commercial Hardware; Div. of Stanley Security Solutions (ST).

2.7 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: Function numbers and descriptions indicated in door hardware sets comply with the following:
 1. Bored Locks: BHMA A156.2.
 2. Mortise Locks: BHMA A156.13.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 1. Bored Locks: Minimum 1/2-inch latchbolt throw.
 2. Mortise Locks: Minimum 3/4-inch latchbolt throw.
 3. Deadbolts: Minimum 1-inch bolt throw.
- C. Backset: 2-3/4 inches, unless otherwise indicated.
- D. Strikes: Manufacturer's standard strike with strike box for each latchbolt or lock bolt, with curved lip extended to protect frame, finished to match door hardware set, and as follows:

1. Strikes for Bored Locks and Latches: BHMA A156.2.
2. Strikes for Mortise Locks and Latches: BHMA A156.13.
3. Strikes for Interconnected Locks and Latches: BHMA A156.12.
4. Strikes for Auxiliary Deadlocks: BHMA A156.5.
5. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
6. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
7. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.

E. Mortise Locks: BHMA A156.13, Grade 1; Series 1000; Stamped steel case with steel or brass parts. Listed under Category F in BHMA's "Certified Product Directory."

1. Manufacturers:
 - a. Best Access Systems, Dormakaba Group (BE), 40H Series.
 - b. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SA), 8200 Series.
 - c. Schlage Commercial Lock Division; an Allegion Company (SCH), L Series.

2.8 ELECTRIC STRIKES

A. Electric Strikes: BHMA A156.31; Grade 1; with faceplate to suit lock and frame.

B. General: Use fail-secure electric strikes with fire-rated devices.

C. Manufacturers:

1. H.E.S. an ASSA ABLOY Group company (HS).
2. Precision Hardware, Inc.; Division of Stanley Security Solutions (PR).
3. Von Duprin; an Allegion Company (VO).

2.9 ELECTROMECHANICAL LOCKS

A. General: BHMA A156.25; Grade 1; motor or solenoid driven; with strike that suites frame.

B. Manufacturers:

1. Best Access Systems; Dormakaba Group (BE).
2. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SA).
3. Schlage Commercial Lock Division; an Allegion Company (SC).

2.10 POWER TRANSFERS

A. Concealed Electrical Power Transfers: UL 10C fire-rated, ANSI A250.13 (+/- 150 psf) windstorm listed. Units transfer power from frame hinge side to the door electrified hardware:

1. Manufacturers:
 - a. Von Duprin (VO) for use with Von Duprin Exit Devices: EPT 10
 - b. Securitron (SN) for use with Locksets: EL CEPT.

2.11 DOOR BOLTS

- A. Bolt Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Half-Round Surface Bolts: Minimum 7/8-inch throw.
 - 2. Interlocking Surface Bolts: Minimum 15/16-inch throw.
 - 3. Fire-Rated Surface Bolts: Minimum 1-inch throw; listed and labeled for fire-rated doors.
 - 4. Dutch-Door Bolts: Minimum 3/4-inch throw.
 - 5. Mortise Flush Bolts: Minimum 3/4-inch throw.
- B. Dustproof Strikes: BHMA A156.16, Grade 1.
- C. Surface Bolts: BHMA A156.16, Grade 1 unless Grade 2 is indicated.
 - 1. Flush Bolt Heads: Minimum of 1/2-inch- diameter rods of brass, bronze, or stainless steel with minimum 12-inch- long rod for doors up to 84 inches in height. Provide longer rods as necessary for doors exceeding 84 inches.
 - 2. Manufacturers:
 - a. Glynn-Johnson; an Allegion Company (GL).
 - b. Hager Companies (HA).
 - c. Stanley Commercial Hardware; Div. of Stanley Security Solutions (ST).
- D. Manual Flush Bolts: BHMA A156.16, Grade 1 unless Grade 2 is indicated; minimum 3/4-inch throw; designed for mortising into door edge.
 - 1. Manufacturers:
 - a. Adams Rite Manufacturing Co. (ARM).
 - b. Glynn-Johnson; an Allegion Company (GL).
 - c. Hager Companies (HA).
 - d. Stanley Commercial Hardware; Div. of Stanley Security Solutions (ST).
- E. Automatic and Self-Latching Flush Bolts:
 - 1. Automatic Flush Bolts: BHMA A156.3, Type 25; minimum 3/4-inch throw; with dust-proof strikes; designed for mortising into door edge. Include wear plates.
 - 2. Self-Latching Flush Bolts: BHMA A156.3, Type 27; minimum 3/4-inch throw; with dust-proof strikes; designed for mortising into door edge. Include wear plates.
 - 3. Manufacturers:
 - a. Glynn-Johnson; an Allegion Company (GL).
 - b. Hager Companies (HA).
 - c. Stanley Commercial Hardware; Div. of Stanley Security Solutions (ST).

2.12 EXIT DEVICES AND AUXILARY ITEMS

- A. Exit Devices: BHMA A156.3.
- B. Exit Devices for Means of Egress Doors: Comply with NFPA 101. Exit devices shall not require more than 15 lbf (67 N) to release the latch. Locks shall not require use of a key, tool, or special knowledge for operation.

- C. Panic Exit Devices: Listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
- D. Fire Exit Devices: Devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252.
- E. Removable Mullions: BHMA A156.3.
- F. Fire-Exit Removable Mullions: Provide removable mullions for use with fire exit devices complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire and panic protection, based on testing according to UL 305 and NFPA 252. Mullions shall be used only with exit devices for which they have been tested.
- G. Dummy Push Bar: Nonfunctioning push bar matching functional push bar.
- H. Outside Trim: Material and finish to match locksets, unless otherwise indicated.
 - 1. Match design for locksets and latches, unless otherwise indicated.
- I. Through Bolts: For exit devices and trim on fire-rated wood doors.
- J. Electronic Exit Bars: Nonlatching electronic releasing device, activated by an adjustable capacitance sensor, with no moving parts; listed and labeled as panic exit hardware. Fabricate bar from extruded aluminum and provide door and frame transfer device and 16 feet of cord to route wiring off the door frame.
- K. Manufacturers:
 - 1. Precision Exit Devices; Div. of Stanley Security Solutions (PR).
 - 2. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SA), 80 Series.
 - 3. Von Duprin; an Allegion Company (VO), 90 Series.

2.13 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver. Provide cylinder from same manufacturer of locking devices.
 - 1. Manufacturers:
 - a. Best Access Systems, Dormakaba Group (BE).
 - b. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SA).
 - c. Schlage Commercial Lock Division; an Allegion Company (SCH).
 - d. Yale Commercial Locks and Hardware; an ASSA ABLOY Group company (YAL).
- B. Standard Lock Cylinders: BHMA A156.5; Grade 1 permanent cores; face finished to match lockset.
 - 1. Core Type: Removable.
- C. High-Security Lock Cylinders: BHMA A156.30; Grade 1 permanent cores that are removable; face finished to match lockset.
 - 1. Type: M, mechanical.

- D. Permanent Cores: Manufacturer's standard; finish face to match lockset; complying with the following:
 - 1. Interchangeable Cores: Core insert, removable by use of a special key; usable with other manufacturers' cylinders.
- E. Construction Keying: Comply with the following:
 - 1. Construction Cores: Provide construction cores that are replaceable by permanent cores. Provide 10 construction master keys.
 - a. Replace construction cores with permanent cores as directed by Owner.

2.14 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference, and as follows:
 - 1. Grand Master Key System: Cylinders are operated by a change key, a master key, and a grand master key.
- B. Keys: Nickel silver.
 - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: "DO NOT DUPLICATE".
 - 2. Quantity: In addition to one extra key blank for each lock, provide the following:
 - a. Cylinder Change Keys: Three.
 - b. Master Keys: Five.
 - c. Grand Master Keys: Five.

2.15 KEY CONTROL SYSTEM

- A. Key Control Cabinet: BHMA A156.5, Grade 1; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.
 - 1. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.

2.16 OPERATING TRIM

- A. Standard: BHMA A156.6; Fabricate from stainless steel, unless otherwise indicated.
- B. Manufacturers:
 - 1. Hager Companies (HA).
 - 2. IVES Hardware; an Allegion Company (IV).
 - 3. Rockwood Manufacturing Company (RO).

2.17 CLOSERS

- A. Door Closers for Means of Egress Doors: Comply with NFPA 101. Door closers shall not require more than 30 lbf (133 N) to set door in motion and not more than 15 lbf (67 N) to open door to minimum required width.
- B. Hold-Open Closers/Detectors: Coordinate and interface integral smoke detector and closer device with fire alarm system.
- C. Power-Assist Closers: As specified in Division 08 Section "Automatic Door Operators" for access doors for people with disabilities or where listed in the door hardware sets.
- D. Size of Units: Unless otherwise indicated, comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
- E. Surface Closers: BHMA A156.4, Grade 1 unless Grade 2 is indicated. Listed under Category C in BHMA's "Certified Product Directory." Provide type of arm required for closer to be located on non-public side of door, unless otherwise indicated.
 - 1. Manufacturers:
 - a. LCN Closers; an Allegion Company (LC), 4040XP.
 - b. Sargent; an ASSA ABLOY Group company (NO).
 - c. Stanley Commercial Hardware (ST), 8000.
- F. Closer Holder Release Devices: BHMA A156.15. Listed under Category C in BHMA's "Certified Product Directory."
 - 1. Life-Safety Type: On release of hold open, door becomes self-closing. Automatic release is activated by smoke detection system or loss of power.
 - 2. Manufacturers:
 - a. DORMA Architectural Hardware; Member of The DORMA Group North America (DO).
 - b. LCN Closers; an Allegion Company (LC).
 - c. Norton Door Controls; an ASSA ABLOY Group company (NO).
 - d. Rixson Specialty Door Controls; an ASSA ABLOY Group company (R).
- G. Coordinators: BHMA A156.3; consisting of active-leaf, hold-open lever and inactive-leaf release trigger; fabricated from steel with nylon-coated strike plates; with built-in, adjustable safety release.

2.18 STOPS AND HOLDERS

- A. Stops and Bumpers: BHMA A156.16, Grade 1 unless Grade 2 is indicated.
 - 1. Provide floor stops for doors unless wall or other type stops are scheduled or indicated. Do not mount floor stops where they will impede traffic. Where floor or wall stops are not appropriate, provide overhead holders.
- B. Mechanical Door Holders: BHMA A156.16, Grade 1 unless Grade 2 is indicated.

- C. Combination Floor and Wall Stops and Holders: BHMA A156.8, Grade 1 unless Grade 2 is indicated.
- D. Silencers for Metal Door Frames: BHMA A156.16, Grade 1; neoprene or rubber, minimum diameter 1/2 inch; fabricated for drilled-in application to frame.
- E. Manufacturers:
 - 1. Hager Companies (HA).
 - 2. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RI).
 - 3. Rockwood Manufacturing Company (RO).
- F. Combination Overhead Stops and Holders: BHMA A156.8, Grade 1 unless Grade 2 is indicated.
 - 1. Glynn-Johnson; an Allegion Company (GL).
 - 2. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SA).
 - 3. Rixson Specialty Door Controls; an Assa Abloy Group Company (RI).

2.19 ELECTROMAGNETIC STOPS AND HOLDERS

- A. Electromagnetic Door Holders: BHMA A156.15, Grade 1; wall-mounted and floor-mounted electromagnetic units with strike plate attached to swinging door; coordinated with fire detectors and interface with fire-alarm system for labeled fire-rated door assemblies.
 - 1. Manufacturers:
 - a. LCN Electromagnetic Door Holders; an Allegion Company (LC).
 - b. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RX).
 - c. SARGENT Manufacturing Company; an ASSA ABLOY Group company (SA).

2.20 DOOR GASKETING

- A. Standard: BHMA A156.22. Listed under Category J in BHMA's "Certified Product Directory."
- B. General: Provide continuous weather-strip gasketing on exterior doors and provide smoke, light, or sound gasketing on interior doors where indicated or scheduled. Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.
 - 1. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
 - 2. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.
 - 3. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.
 - 4. Surface Automatic Door Bottoms: Surface mounted metal enclosure, gasket drops to seal with threshold when door is closed.
- C. Air Leakage: Not to exceed 0.50 cfm per foot of crack length for gasketing other than for smoke control, as tested according to ASTM E 283.
- D. 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 gasketing on 20-minute-rated doors and on smoke-labeled doors.

- E. 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 NFPA 252.
 - 1. Test Pressure: After 5 minutes into the test, neutral pressure level in furnace shall be established at 40 inches or less above the sill.
- F. Sound-Rated Gasketing: Assemblies that are listed and labeled by a testing and inspecting agency, for sound ratings indicated, based on testing according to ASTM E 1408.
- G. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strips are easily replaceable and readily available from stocks maintained by manufacturer.
- H. Gasketing Materials: ASTM D 2000 and AAMA 701/702.
- I. Manufacturers:
 - 1. National Guard Products (NA).
 - 2. Pemko Manufacturing Co. (PE).
 - 3. Zero International, an Allegion brand.

2.21 THRESHOLDS

- A. Standard: BHMA A156.21. Listed under Category J in BHMA's "Certified Product Directory."
- B. Thresholds for Means of Egress Doors: Comply with NFPA 101. Maximum 1/2 inch high.
- C. Manufacturers:
 - 1. National Guard Products (NA).
 - 2. Pemko Manufacturing Co. (PEM).
 - 3. Rixson Specialty Door Controls; an ASSA ABLOY Group company (RIX).

2.22 METAL PROTECTIVE TRIM UNITS

- A. Size: 1-1/2 inches less than door width on push side and 1/2 inch less than door width on pull side, by height specified in door hardware sets.
- B. Fasteners: Manufacturer's standard machine or self-tapping screws.
- C. Metal Protective Trim Units: BHMA A156.6; beveled top and 2 sides; fabricated from the following material:
 - 1. Material: 0.050-inch- thick stainless steel.
 - 2. Manufacturers:
 - a. Hager Companies (HA).
 - b. IVES Hardware; an Allegion Company (IV).
 - c. Rockwood Manufacturing Company (RO).

2.23 AUXILIARY ELECTRIFIED DOOR HARDWARE

- A. Boxed Power Supplies: Modular unit in NEMA ICS 6, Type 4 enclosure; filtered and regulated; voltage rating and type matching requirements of door hardware served; and listed and labeled for use with fire alarm systems.
- B. Auxiliary Electrified Door Hardware:
 - 1. Manufacturers:
 - a. Securitron (SN).
 - b. Von Duprin (VO).

2.24 FABRICATION

- A. Manufacturer's Nameplate: Do not provide products that have manufacturer's name or trade name displayed in a visible location except in conjunction with required fire-rated labels and as otherwise approved by Architect.
 - 1. Manufacturer's identification is permitted on rim of lock cylinders only.
- B. Base Metals: Produce door hardware units of base metal, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18. Do not furnish manufacturer's standard materials or forming methods if different from specified standard.
- C. Fasteners: Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. Provide screws according to commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Steel Machine or Wood Screws: For the following fire-rated applications:
 - a. Mortise hinges to doors.
 - b. Strike plates to frames.
 - c. Closers to doors and frames.
 - 3. Steel Through Bolts: For the following fire-rated applications unless door blocking is provided:
 - a. Surface hinges to doors.
 - b. Closers to doors and frames.
 - c. Surface-mounted exit devices.
 - 4. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 - 5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

6. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

2.25 FINISHES

- A. Standard: BHMA A156.18, as indicated in door hardware sets.
- 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, 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. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 Series.
 1. Surface-Applied Door Hardware: Drill and tap doors and frames according to ANSI A250.6.
- B. Wood Doors: Comply with DHI A115-W Series.

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights indicated as follows unless otherwise 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. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim

units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.

1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- D. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.
1. Configuration: Provide one power supply for each door opening.
- E. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

3.4 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.
1. Spring Hinges: Adjust to achieve positive latching when door is allowed to close freely from an open position of 30 degrees.
 2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
 3. Door Closers: Unless otherwise required by authorities having jurisdiction, adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the leading edge of the door.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

3.7 DOOR HARDWARE SETS

- A. General: Provide hardware for each door to comply with requirements of the Door and Frame Schedule indicated on drawings. The following hardware set schedule corresponds with hardware set numbers indicated in the Door and Frame Schedule.
- B. See attached.

Hardware Schedule

Heading #01

1 Pair Doors #100A

CH1	2	Continuous Hinge	780-112HD 95"	CLR	HA
MUL	1	Removable Mullion	KR822	689	PR
ED1	1	Exit Device	2103	630	PR
ED2	1	Exit Device	2101	630	PR
CORE	2	Core	1CM-7MM11	626	BE
RCYL	2	Rim Cylinder	12E-72 L/C	626	BE
P01	2	Door Pull	12L	US32D	HA
BSS	2	Spacer Kit	581-2	EN	SA
C01	2	Closer	351 CPS	EN	SA
DP1	2	Drop Plate	351-D	EN	SA
DPS	2	Switch	679-05HM		LO
N1	1	Note(By Others)	INTEGRAL GASKETING BY DOOR/FRAME MANUFACTURER		PREP
DS1	2	Gasketing	C627 A 36"		NA
MS1	1	Mullion Seal	5100N-96 96"		NA
TH1	1	Saddle Threshold	424 72" PA	AL	NA

Heading #02

1 Pair Doors #100C

CH1	2	Continuous Hinge	780-112HD 95"	CLR	HA
MUL	1	Removable Mullion	KR822	689	PR
ED1	1	Exit Device	2103	630	PR
ED2	1	Exit Device	2101	630	PR
CORE	2	Core	1CM-7MM11	626	BE
RCYL	2	Rim Cylinder	12E-72 L/C	626	BE
P01	2	Door Pull	12L	US32D	HA
BSS	2	Spacer Kit	581-2	EN	SA
C01	2	Closer	351 CPS	EN	SA
DP1	2	Drop Plate	351-D	EN	SA
W01	2	Concave Wall Stop	236W	US32D	HA
DPS	1	Switch	679-05HM		LO
MS1	1	Mullion Seal	5100N-96 96"		NA

Heading #03

1 Pair Doors #100B

CH1	2	Continuous Hinge	780-112HD 95"	CLR	HA
MUL	1	Removable Mullion	KR822	689	PR
ED1	1	Exit Device	2103	630	PR
ED2	1	Exit Device	2101	630	PR
CORE	2	Core	1CM-7MM11	626	BE
RCYL	2	Rim Cylinder	12E-72 L/C	626	BE
ES1	1	Electric Strike Body	9600	630	HS
P01	2	Door Pull	12L	US32D	HA
BSS	2	Spacer Kit	581-2	EN	SA
C01	2	Closer	351 CPS	EN	SA
DP1	2	Drop Plate	351-D	EN	SA
DPS	2	Switch	679-05HM		LO
N1	1	Note(By Others)	INTEGRAL GASKETING BY DOOR/FRAME MANUFACTURER		PREP
N2	1	Note(By Others)	ACCESS CONTROL/CARD READER BY OTHERS		PREP
N3	1	Note(By Others)	MOUNT ELECTRIC STRIKE ON THE MULLION FOR THE RHR DOOR LEAF		PREP
N5	1	Note (By Others)	FIELD MODIFY MULLION FOR ELECTRICAL HARNESS TO THE STRIKE		PREP
PS1	1	Power Supply	BPS-24-1		SN
WH1	1	Wire Harness	EZAA-60		AB
WH2	1	Wire Harness	EZAA-192-1		AB
DS1	2	Gasketing	C627 A 36"		NA
MS1	1	Mullion Seal	5100N-96 96"		NA
TH1	1	Saddle Threshold	424 72" PA	AL	NA

Heading #04

1 Pair Doors #100D

CH1	2	Continuous Hinge	780-112HD 95"	CLR	HA
MUL	1	Removable Mullion	KR822	689	PR
ED1	1	Exit Device	2103	630	PR
ED2	1	Exit Device	2101	630	PR
CORE	2	Core	1CM-7MM11	626	BE
RCYL	2	Rim Cylinder	12E-72 L/C	626	BE
ES1	1	Electric Strike Body	9600	630	HS
P01	2	Door Pull	12L	US32D	HA
BSS	2	Spacer Kit	581-2	EN	SA
C01	2	Closer	351 CPS	EN	SA
DP1	2	Drop Plate	351-D	EN	SA
DPS	2	Switch	679-05HM		LO
N2	1	Note(By Others)	ACCESS CONTROL/CARD READER BY OTHERS		PREP
N3	1	Note(By Others)	MOUNT ELECTRIC STRIKE ON THE MULLION FOR THE RHR DOOR LEAF		PREP
N5	1	Note (By Others)	FIELD MODIFY MULLION FOR ELECTRICAL HARNESS TO THE STRIKE		PREP
PS1	1	Power Supply	BPS-24-1		SN
WH1	1	Wire Harness	EZAA-60		AB
WH2	1	Wire Harness	EZAA-192-1		AB

Heading #05

1 Single Door #100AA

CH1	1	Continuous Hinge	780-112HD 95"	CLR	HA
ED1	1	Exit Device	2103	630	PR
CORE	1	Core	1CM-7MM11	626	BE
RCYL	1	Rim Cylinder	12E-72 L/C	626	BE
ES1	1	Electric Strike Body	9600	630	HS
P01	1	Door Pull	12L	US32D	HA
W01	1	Concave Wall Stop	236W	US32D	HA
ACT	2	Actuator	CL4163	630	SD
AO	1	Low Energy Operator	D-4990		SD01
DPS	1	Switch	679-05HM		LO
MBX	2	Surface Mounting Box	CL4638		SD
N2	1	Note(By Others)	ACCESS CONTROL/CARD READER BY OTHERS		PREP

Heading #06

1 Single Door #100AB

CH1	1	Continuous Hinge	780-112HD 95"	CLR	HA
ED1	1	Exit Device	2103	630	PR
CORE	1	Core	1CM-7MM11	626	BE
RCYL	1	Rim Cylinder	12E-72 L/C	626	BE
ES1	1	Electric Strike Body	9600	630	HS
P01	1	Door Pull	12L	US32D	HA
W01	1	Concave Wall Stop	236W	US32D	HA
ACT	2	Actuator	CL4163	630	SD
AO	1	Low Energy Operator	D-4990		SD01
DPS	1	Switch	679-05HM		LO
MBX	2	Surface Mounting Box	CL4638		SD
N1	1	Note(By Others)	INTEGRAL GASKETING BY DOOR/FRAME MANUFACTURER		PREP
N2	1	Note(By Others)	ACCESS CONTROL/CARD READER BY OTHERS		PREP
DS2	1	Gasketing	C627 A 42"		NA
TH2	1	Saddle Threshold	424 42" PA	AL	NA

Heading #08

1 Pair Doors #102

1 Pair Doors #133A

CH1	4	Continuous Hinge	780-112HD 95"	CLR	HA
FB1	4	Flush Bolt	282D	US26D	HA
M001	2	24" Rod	282R	ZP	HA01
L38	2	Lockset	45H-7INL15H L/C	626	BE
CORE	4	Core	1CM-7MM11	626	BE
C02	4	Closer	351 UH	EN	SA
DPP	2	Dust Proof Strike	280X	US26D	HA
AST2	4	Gasketing	A605 A 96"		NA

Heading #09

1 Single Door #104

B01	3	Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
L04	1	Lockset	45H-7D15H L/C	626	BE
CORE	1	Core	1CM-7MM11	626	BE
OHS1	1	Overhead Stop	904S	US32D	GL
S1	3	Silencer	Q146		SF01

Heading #10

- 1 Single Door #106
- 1 Single Door #108
- 1 Single Door #109
- 1 Single Door #140
- 1 Single Door #161
- 1 Single Door #210
- 1 Single Door #310

B01	21 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
L04	7 Lockset	45H-7D15H L/C	626	BE
CORE	7 Core	1CM-7MM11	626	BE
W01	7 Concave Wall Stop	236W	US32D	HA
S1	21 Silencer	Q146		SF01

Heading #11

- 1 Single Door #107
- 1 Single Door #152
- 1 Single Door #155
- 1 Single Door #160

B01	12 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
L05	4 Lockset	45H-7A15H L/C	626	BE
CORE	4 Core	1CM-7MM11	626	BE
W01	4 Concave Wall Stop	236W	US32D	HA
S1	12 Silencer	Q146		SF01

Heading #12

- 1 Single Door #110A
- 1 Single Door #110B
- 1 Single Door #111
- 1 Single Door #112
- 1 Single Door #113
- 1 Single Door #GH1
- 1 Single Door #GH2
- 1 Single Door #GH3
- 1 Single Door #GH4

Opening Description: 3' 0" x 8' 0"

CORE	9 Core	1CM-7MM11	626	BE
MCYL	9 Mortise Cylinder	1E-74 L/C	626	BE
N4	9 Note(By Others)	BALANCE OF HARDWARE BY THE DOOR MFGR		PREP

Heading #13

1 Single Door #110C

CH1	1	Continuous Hinge	780-112HD 95"	CLR	HA
ED1	1	Exit Device	2103	630	PR
CORE	1	Core	1CM-7MM11	626	BE
RCYL	1	Rim Cylinder	12E-72 L/C	626	BE
P01	1	Door Pull	12L	US32D	HA
BSS	1	Spacer Kit	581-2	EN	SA
C01	1	Closer	351 CPS	EN	SA
DP1	1	Drop Plate	351-D	EN	SA
DPS	1	Switch	679-05HM		LO
N1	1	Note(By Others)	INTEGRAL GASKETING BY DOOR/FRAME MANUFACTURER		PREP
DS1	1	Gasketing	C627 A 36"		NA
TH2	1	Saddle Threshold	424 42" PA	AL	NA

Heading #14

- 1 Single Door #116
- 1 Single Door #117
- 1 Single Door #211
- 1 Single Door #212
- 1 Single Door #309
- 1 Single Door #311

B01	18	Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
DL1	6	Deadlock	48H-7R L/C	626	BE
CORE	6	Core	1CM-7MM11	626	BE
P02	6	Push Plate	30S 6 X 16	US32D	HA
P03	6	Pull Plate	33G 4 X 16	US32D	HA
C03	6	Closer	351 UO	EN	SA
KP1	6	Protection Plate	190S 8" x 34"	US32D	HA
W01	6	Concave Wall Stop	236W	US32D	HA
S1	18	Silencer	Q146		SF01

Heading #15

- 1 Single Door #122A
- 1 Single Door #202
- 1 Single Door #204A
- 1 Single Door #206A
- 1 Single Door #209A
- 1 Single Door #304
- 1 Single Door #305A
- 1 Single Door #320
- 1 Single Door #322

B02	27	Hinge	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
L38	9	Lockset	45H-7INL15H L/C	626	BE
CORE	9	Core	1CM-7MM11	626	BE
W02	9	Floor Stop	327W	US26D	HA
S1	27	Silencer	Q146		SF01

Heading #16

1 Pair Doors #133B

B02	6 Hinge	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
FB1	2 Flush Bolt	282D	US26D	HA
L38	1 Lockset	45H-7INL15H L/C	626	BE
CORE	2 Core	1CM-7MM11	626	BE
W02	2 Floor Stop	327W	US26D	HA
DPP	1 Dust Proof Strike	280X	US26D	HA
AST3	1 Length Pile Astragal	336 P 84"		NA
S1	2 Silencer	Q146		SF01

Heading #17

1 Single Door #141

B01	3 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
L04	1 Lockset	45H-7D15H L/C	626	BE
CORE	1 Core	1CM-7MM11	626	BE
C03	1 Closer	351 UO	EN	SA
W01	1 Concave Wall Stop	236W	US32D	HA
S1	3 Silencer	Q146		SF01

Heading #18

1 Pair Doors #142A

1 Pair Doors #144A

B01	16 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
FB1	4 Flush Bolt	282D	US26D	HA
M001	2 24" Rod	282R	ZP	HA01
L04	2 Lockset	45H-7D15H L/C	626	BE
CORE	2 Core	1CM-7MM11	626	BE
C02	2 Closer	351 UH	EN	SA
W01	4 Concave Wall Stop	236W	US32D	HA
DPP	2 Dust Proof Strike	280X	US26D	HA
S1	4 Silencer	Q146		SF01

Heading #19

1 Single Door #143

B03	3 Hinge	BB1168 4 1/2 X 4 1/2	US26D	HA
L04	1 Lockset	45H-7D15H L/C	626	BE
CORE	1 Core	1CM-7MM11	626	BE
C03	1 Closer	351 UO	EN	SA
W01	1 Concave Wall Stop	236W	US32D	HA
S1	3 Silencer	Q146		SF01

Heading #20

- 1 Single Door #142B
- 1 Single Door #144B
- 1 Single Door #159

B04	9 Hinge	BB1191 4 1/2 X 4 1/2 NRP	US32D	HA
L04	3 Lockset	45H-7D15H L/C	626	BE
CORE	3 Core	1CM-7MM11	626	BE
C01	3 Closer	351 CPS	EN	SA
DPS	3 Switch	679-05HM		LO
GS1	3 Gasketing	160 V 1 x 36" 2 x 84"		NA
DS3	3 Door Sweep	200 NA 36"		NA
TH3	3 Threshold	896 V 36" PA	AL	NA

Heading #21

- 1 Pair Doors #145A

B05	8 Hinge	BB1199 4 1/2 X 4 1/2 NRP	US32D	HA
FB1	2 Flush Bolt	282D	US26D	HA
M001	1 24" Rod	282R	ZP	HA01
L71	1 Electromechanical Lock	45HW-7DEU15H L/C	626	BE
CORE	1 Core	1CM-7MM11	626	BE
C02	2 Closer	351 UH	EN	SA
DPS	2 Switch	679-05HM		LO
EPT	1 Electric Power Transfer	EPT 10	SP28	VO
LG	1 Protector Plate	345D	US32D	HA
N2	1 Note(By Others)	ACCESS CONTROL/CARD READER BY OTHERS		PREP
PS1	1 Power Supply	BPS-24-1		SN
GS2	1 Gasketing	160 V 1 x 96" 2 x 96"		NA
DS4	2 Door Sweep	200 NA 48"		NA
TH4	1 Saddle Threshold	424 96" PA	AL	NA

Heading #22

- 1 Pair Doors #145B

B01	8 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
FB1	2 Flush Bolt	282D	US26D	HA
M001	1 24" Rod	282R	ZP	HA01
L04	1 Lockset	45H-7D15H L/C	626	BE
CORE	1 Core	1CM-7MM11	626	BE
C02	1 Closer	351 UH	EN	SA
F01	1 Dome Floor Stop	242F	US26D	HA
W01	1 Concave Wall Stop	236W	US32D	HA
DPP	1 Dust Proof Strike	280X	US26D	HA
S1	2 Silencer	Q146		SF01

Heading #23

1 Single Door #150A

B02	3	Hinge	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
ED3	1	Exit Device	2103 X 4903A	630	PR
CORE	1	Core	1CM-7MM11	626	BE
RCYL	1	Rim Cylinder	12E-72 L/C	626	BE
ES1	1	Electric Strike Body	9600	630	HS
ACT	2	Actuator	CL4163	630	SD
AO	1	Low Energy Operator	D-4990		SD01
MBX	2	Surface Mounting Box	CL4638		SD
W01	1	Concave Wall Stop	236W	US32D	HA
N2	1	Note(By Others)	ACCESS CONTROL/CARD READER BY OTHERS		PREP
PS1	1	Power Supply	BPS-24-1		SN

Heading #24

1 Single Door #150B

B02	3	Hinge	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
L04	1	Lockset	45H-7D15H L/C	626	BE
CORE	1	Core	1CM-7MM11	626	BE
ES1	1	Electric Strike Body	9600	630	HS
C03	1	Closer	351 UO	EN	SA
W01	1	Concave Wall Stop	236W	US32D	HA
N2	1	Note(By Others)	ACCESS CONTROL/CARD READER BY OTHERS		PREP
PS1	1	Power Supply	BPS-24-1		SN
S1	3	Silencer	Q146		SF01

Heading #25

1 Single Door #150C

CH1	1	Continuous Hinge	780-112HD 95"	CLR	HA
ED1	1	Exit Device	2103	630	PR
CORE	1	Core	1CM-7MM11	626	BE
RCYL	1	Rim Cylinder	12E-72 L/C	626	BE
ES1	1	Electric Strike Body	9600	630	HS
P01	1	Door Pull	12L	US32D	HA
ACT	1	Actuator	CL4163	630	SD
AO	1	Low Energy Operator	D-4990		SD01
DPS	1	Switch	679-05HM		LO
MBX	1	Surface Mounting Box	CL4638		SD
N1	1	Note(By Others)	INTEGRAL GASKETING BY DOOR/FRAME MANUFACTURER		PREP
N2	1	Note(By Others)	ACCESS CONTROL/CARD READER BY OTHERS		PREP
DS1	1	Gasketing	C627 A 36"		NA
TH5	1	Saddle Threshold	424 36" PA	AL	NA

Heading #26

- 1 Single Door #154
- 1 Single Door #156
- 1 Single Door #158

B01	9 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
L15	3 Passage Set	45H-0N15H	626	BE
W01	3 Concave Wall Stop	236W	US32D	HA
S1	9 Silencer	Q146		SF01

Heading #27

- 1 Single Door #157

B01	3 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
L65	1 Privacy Set	45H-0L15H	626	BE
W01	1 Concave Wall Stop	236W	US32D	HA
S1	3 Silencer	Q146		SF01

Heading #28

- 1 Single Door #159A

B02	3 Hinge	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
L04	1 Lockset	45H-7D15H L/C	626	BE
CORE	1 Core	1CM-7MM11	626	BE
W01	1 Concave Wall Stop	236W	US32D	HA
S1	3 Silencer	Q146		SF01

Heading #29

- 1 Single Door #A100A

B01	3 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
ED4	1 Exit Device	FL 2114 X 4914A	630	PR
C01	1 Closer	351 CPS	EN	SA
KP1	1 Protection Plate	190S 8" x 34"	US32D	HA
F01	1 Dome Floor Stop	242F	US26D	HA
GS3	1 Gasketing	5050 C-17 17'		NA

Heading #30

- 1 Single Door #B100A

B01	3 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
ED4	1 Exit Device	FL 2114 X 4914A	630	PR
C03	1 Closer	351 UO	EN	SA
KP1	1 Protection Plate	190S 8" x 34"	US32D	HA
W01	1 Concave Wall Stop	236W	US32D	HA
GS3	1 Gasketing	5050 C-17 17'		NA

Heading #31

1 Single Door #A100B

1 Single Door #B100B

CH1	2	Continuous Hinge	780-112HD 95"	CLR	HA
ED1	2	Exit Device	2103	630	PR
CORE	2	Core	1CM-7MM11	626	BE
RCYL	2	Rim Cylinder	12E-72 L/C	626	BE
P01	2	Door Pull	12L	US32D	HA
BSS	2	Spacer Kit	581-2	EN	SA
C01	2	Closer	351 CPS	EN	SA
DP1	2	Drop Plate	351-D	EN	SA
DPS	2	Switch	679-05HM		LO
N1	2	Note(By Others)	INTEGRAL GASKETING BY DOOR/FRAME MANUFACTURER		PREP
DS5	2	Gasketing	C627 A 41"		NA
TH6	2	Saddle Threshold	424 41" PA	AL	NA

Heading #32

1 Pair Doors #B200

1 Pair Doors #B300

Opening Description: 6' 0" x 7' 0" x 60Min

B03	12	Hinge	BB1168 4 1/2 X 4 1/2	US26D	HA
ED6	4	Exit Device	FL 2214 X 4914A LBR	630	PR
EMH1	2	Magnetic Holder	994M	689	RX
EMH2	2	Magnetic Holder	980M	689	RX
C03	4	Closer	351 UO	EN	SA
KP1	4	Protection Plate	190S 8" x 34"	US32D	HA
AST1	4	Gasketing	A605 A 84"		NA
GS4	2	Gasketing	5050 C-20 20'		NA

Heading #32.1

1 Pair Doors #A200

1 Pair Doors #A300

Opening Description: 2 - 3' 0" x 7' 0" x 60Min (A300)

6' 0" x 7' 0" x 60Min (A200)

B03	12	Hinge	BB1168 4 1/2 X 4 1/2	US26D	HA
ED6	4	Exit Device	FL 2214 X 4914A LBR	630	PR
EMH1	4	Magnetic Holder	994M	689	RX
C03	4	Closer	351 UO	EN	SA
KP1	4	Protection Plate	190S 8" x 34"	US32D	HA
AST1	4	Gasketing	A605 A 84"		NA
GS4	2	Gasketing	5050 C-20 20'		NA

Heading #33

- 1 Pair Doors #200A
- 1 Pair Doors #200B
- 1 Pair Doors #200C
- 1 Pair Doors #300A
- 1 Pair Doors #306A
- 1 Pair Doors #306B

B02	36 Hinge	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
FB1	12 Flush Bolt	282D	US26D	HA
L04	6 Lockset	45H-7D15H L/C	626	BE
CORE	6 Core	1CM-7MM11	626	BE
OHS1	12 Overhead Stop	904S	US32D	GL
DPP	6 Dust Proof Strike	280X	US26D	HA
S1	12 Silencer	Q146		SF01

Heading #34

- 1 Single Door #204B
- 1 Single Door #206C

B01	6 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
L37	2 Lockset	45H-7R15H L/C	626	BE
CORE	2 Core	1CM-7MM11	626	BE
F01	2 Dome Floor Stop	242F	US26D	HA
S1	6 Silencer	Q146		SF01

Heading #35

- 1 Single Door #204C
- 1 Single Door #206B

CH1	2 Continuous Hinge	780-112HD 95"	CLR	HA
L04	2 Lockset	45H-7D15H L/C	626	BE
CORE	2 Core	1CM-7MM11	626	BE
BSS	2 Spacer Kit	581-2	EN	SA
C01	2 Closer	351 CPS	EN	SA
DP1	2 Drop Plate	351-D	EN	SA
DPS	2 Switch	679-05HM		LO
N1	2 Note(By Others)	INTEGRAL GASKETING BY DOOR/FRAME MANUFACTURER		PREP
DS6	2 Gasketing	C627 A 48"		NA
TH7	2 Saddle Threshold	424 48" PA	AL	NA

Heading #36

- 1 Single Door #204D
- 1 Single Door #302AC
- 1 Single Door #304A

B01	9 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
L37	3 Lockset	45H-7R15H L/C	626	BE
CORE	3 Core	1CM-7MM11	626	BE
OHS2	3 Overhead Stop	104S	US32D	GL
S1	9 Silencer	Q146		SF01

Heading #37

- 1 Pair Doors #319

B01	6 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
ED5	2 Dummy Bar	671DR-3	630	PR
P01	2 Door Pull	12L	US32D	HA
C02	2 Closer	351 UH	EN	SA
KP1	2 Protection Plate	190S 8" x 34"	US32D	HA
W01	2 Concave Wall Stop	236W	US32D	HA
S1	2 Silencer	Q146		SF01

Heading #38

- 1 Pair Doors #301
- 1 Pair Doors #302A

B02	12 Hinge	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
FB1	4 Flush Bolt	282D	US26D	HA
L38	2 Lockset	45H-7INL15H L/C	626	BE
CORE	4 Core	1CM-7MM11	626	BE
W02	4 Floor Stop	327W	US26D	HA
DPP	2 Dust Proof Strike	280X	US26D	HA
AST3A	2 Length Pile Astragal	336 P 96"		NA
S1	4 Silencer	Q146		SF01

Heading #39

- 1 Pair Doors #302B

B02	6 Hinge	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
FB1	2 Flush Bolt	282D	US26D	HA
L38	1 Lockset	45H-7INL15H L/C	626	BE
CORE	1 Core	1CM-7MM11	626	BE
OHS3	1 Overhead Stop	902S	US32D	GL
W02	1 Floor Stop	327W	US26D	HA
DPP	1 Dust Proof Strike	280X	US26D	HA
AST3	1 Length Pile Astragal	336 P 84"		NA
S1	2 Silencer	Q146		SF01

Heading #40

1 Pair Doors #303

B02	6 Hinge	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
FB1	2 Flush Bolt	282D	US26D	HA
L38	1 Lockset	45H-7INL15H L/C	626	BE
CORE	2 Core	1CM-7MM11	626	BE
OHS1	1 Overhead Stop	904S	US32D	GL
OHS3	1 Overhead Stop	902S	US32D	GL
DPP	1 Dust Proof Strike	280X	US26D	HA
AST3	1 Length Pile Astragal	336 P 84"		NA
S1	2 Silencer	Q146		SF01

Heading #41

1 Single Door #305B

B02	3 Hinge	BB1279 4 1/2 x 4 1/2 NRP	US26D	HA
L37	1 Lockset	45H-7R15H L/C	626	BE
CORE	1 Core	1CM-7MM11	626	BE
OHS1	1 Overhead Stop	904S	US32D	GL
S1	3 Silencer	Q146		SF01

Heading #42

1 Single Door #303A

1 Single Door #303B

Opening Description: 3' 0" x 7' 0"

B01	6 Hinge	BB1279 4 1/2 X 4 1/2	US26D	HA
L37	2 Lockset	45H-7R15H L/C	626	BE
CORE	2 Core	1CM-7MM11	626	BE
C03	2 Closer	351 UO	EN	SA
W01	2 Concave Wall Stop	236W	US32D	HA
S1	6 Silencer	Q146		SF01

END OF SECTION

SECTION 087113

AUTOMATIC DOOR OPERATORS

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. Low-energy door operators for swinging doors.
- B. Related Requirements:

1.3 DEFINITIONS

- A. AAADM: American Association of Automatic Door Manufacturers.
- B. Activation Device: A control that, when actuated, sends an electrical signal to the door operator to open the door.
- C. Double-Egress (Doors): A pair of doors that simultaneously swing, with the two doors moving in opposite directions with no mullion between them.
- D. Double-Swing (Doors): A pair of doors that swing, with the two doors moving in opposite directions with a mullion between them; each door functioning as a single-swing door.
- E. Safety Device: A control that, to avoid injury, prevents a door from opening or closing.
- F. For automatic door terminology, see BHMA A156.19 for definitions of terms.

1.4 COORDINATION

- A. Templates: Distribute for doors, frames, and other work specified to be factory prepared and reinforced for installing automatic door operators.
- B. Coordinate hardware for doors with operators to ensure proper size, thickness, hand, function, and finish.
- C. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to the following:
 - 1. Power supplies.
 - 2. Access-control system.

3. Remote activation devices.
4. Remote monitoring systems.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.6 SUBMITTALS

- A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic door operators.
2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.

- B. Shop Drawings: For automatic door operators.

1. Include plans, elevations, sections, hardware mounting heights, and attachment details.
2. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
3. Indicate locations of activation and safety devices.
4. Include diagrams for power, signal, and control wiring.

- C. Samples: For each exposed product and for each color and texture specified, manufacturer's standard size.

- D. Qualification Data: For Installer and Certified Inspector.

- E. Product Certificates: For each type of automatic door operator. For each operator for fire-rated door assemblies, certify that operator is listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for use on types and sizes of labeled fire doors required.

- F. Field quality-control reports.

- G. Sample Warranties: For manufacturer's special warranties.

- H. Maintenance Data: For automatic door operators, safety devices, and control systems, to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation and maintenance of units required for this Project and who employs a Certified Inspector.

- B. Certified Inspector Qualifications: Certified by AAADM.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of automatic door operators that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Faulty or sporadic operation of automatic door operator, including controls.
 - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering or use.
 - 2. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Subject to compliance with requirements, provide products by Stanley Access Technologies; Division of The Stanley Works, or comparable products by one of the following:
 - 1. Besam Automated Entrance Systems, Inc. an ASSA ABLOY Group company.
 - 2. Horton Automatics; a division of Overhead Door Corporation.
- B. Source Limitations: Obtain automatic door operators, including activation and safety devices, from single source from single manufacturer.

2.2 AUTOMATIC DOOR OPERATORS, GENERAL

- A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated; and in accordance with UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.
 - 1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA A252 and NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.
 - 2. Wind Load: Provide door operators on exterior doors that will open and close doors and maintain them in fully closed position when subjected to wind loads. See Structural Drawings for wind loads on exterior walls.
- B. Electromechanical Operating System: Self-contained unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation- and safety-device wiring, and manual operation, including spring closing when power is off.
- C. Hinges: See Section 087100 "Door Hardware" for hinge type for each door that door operator shall accommodate.
- D. Cover for Surface-Mounted Operators: Fabricated from 0.125-inch thick, extruded or formed aluminum; continuous over full width of operator-controlled door opening; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.

- E. Brackets and Reinforcements: Fabricated from aluminum with nonstaining, nonferrous shims for aligning system components.
- F. Fire-Door Package: Consisting of UL-listed latch mechanism, power-reset box, and caution signage for fire-rated doors. Latch mechanism shall allow door to swing free during automatic operation; when fire is detected, latch actuator shall cause exit hardware to latch when door closes. Provide latch actuators with fail-secure design.
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 LOW-ENERGY DOOR OPERATORS FOR SWINGING DOORS

- A. Standard: BHMA A156.19.
- B. Product: Subject to compliance with requirements, provide the following:
 - 1. Stanley Access Technologies, M-Force Series automatic door operator.
- C. Performance Requirements:
 - 1. Opening Force if Power Fails: Not more than 15 lbf required to release latch if provided, not more than 30 lbf required to manually set door in motion, and not more than 15 lbf required to fully open door.
 - 2. Entrapment-Prevention Force: Not more than 15 lbf required to prevent stopped door from closing or opening.
- D. Configuration: Operator to control single swinging door.
 - 1. Traffic Pattern: Two way.
 - 2. Operator Mounting: Surface
- E. Configuration: Operator to control pair of swinging doors.
 - 1. Traffic Pattern: Two way.
 - 2. Operator Mounting: Surface.
- F. Operation: Power opening and spring closing. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.19. When not in automatic mode, door operator shall function as manual door closer, with or without electrical power.
- G. Operating System: Electromechanical.
- H. Microprocessor Control Unit: Solid-state controller.
- I. Features:
 - 1. Adjustable opening and closing speed.
 - 2. Adjustable opening and closing force.
 - 3. Adjustable backcheck.
 - 4. Adjustable hold-open time from zero to 30 seconds.
 - 5. Adjustable time delay.
 - 6. Adjustable acceleration.
 - 7. Obstruction recycle.

8. On-off/hold-open switch to control electric power to operator.

J. Activation Device: Push-plate switch to activate door operator.

K. Exposed Finish:

1. Class II, clear anodic finish.

2.4 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extrusions: ASTM B221 (ASTM B221M).
2. Sheet: ASTM B209 (ASTM B209M).

B. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.5 ELECTRICAL CONTROLS

A. Electrical Control System: Electrical control system shall include a microprocessor controller and position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position. Systems utilizing external magnets and magnetic switches are not acceptable.

B. Performance Data: The microprocessor shall collect, and store performance data as follows:

1. Counter: A non-resettable counter to track operating cycles.
2. Event Reporting: Unit shall include event and error recording including number of occurrences of events and errors, and cycle count of most recent events and errors.
3. LED Display: Display presenting the current operating state of the controller.

C. Controller Protection: The microprocessor controller shall incorporate the following features to ensure trouble free operation:

1. Automatic Reset Upon Power Up.
2. Main Fuse Protection.
3. Electronic Surge Protection.
4. Internal Power Supply Protection.
5. Resettable sensor supply fuse protection.
6. Motor Protection, over-current protection.

D. Soft Start/Stop: A “soft-start” “soft-stop” motor driving circuit shall be provided for smooth normal opening and recycling.

E. Obstruction Recycle: Provide system to recycle the swinging panels when an obstruction is encountered during the closing cycle.

F. Programmable Controller: Microprocessor controller shall be programmable and shall be designed for connection to a local configuration tool. Local configuration tool shall be a software driven handheld interface. The following parameters may be adjusted via the configuration tool.

1. Operating speeds and forces as required to meet ANSI/BHMA A156.19.

2. Adjustable and variable features as specified in 2.3 “Features”.
 3. Firmware update.
 4. Trouble Shooting
 - a. I/O Status.
 - b. Electrical component monitoring including parameter summary.
 5. Software for local configuration tool shall be available as a free download from the sliding automatic entrance manufacturer’s internet site. Software shall be compatible with the following operating system platforms: Palm®, Android®, and Windows Mobile®.
- G. Emergency Breakout Switch: A cam actuated emergency breakout switch shall be provided to disconnect power to the motor when an in-swinging door is manually pushed in the emergency out direction. The operator will then automatically reset and power will be resumed.
- H. Control Switch: Automatic door operators shall be equipped with a three position function switch to control the operation of the door. Control switch shall provide three modes of operation, Automatic, Off, and Hold-Open.
- I. Power Switch: Automatic door operators shall be equipped with a two position On/Off switch to control power to the door.

2.6 ACTIVATION AND SAFETY DEVICES

- A. General: Provide activation and safety devices, in accordance with BHMA standards; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.
- B. Motion Sensors: Self-contained, K-band-frequency, microwave-scanner units; fully enclosed in plastic housing; adjustable to provide detection field sizes and functions required by BHMA A156.10.
1. Product: Subject to compliance with requirements, provide the following:
 - a. Stanley Access Technologies, SU 100 Motion Sensor.
 2. Provide capability for switching between bidirectional and unidirectional detection.
 3. For one-way traffic, sensor on egress side shall not be active when doors are fully closed.
- C. Presence Sensors: Self-contained, active-infrared scanner units; adjustable to provide detection field sizes and functions required by BHMA A156.10. Sensors shall remain active at all times.
1. Product: Subject to compliance with requirements, provide the following:
 - a. Stanley Access Technologies, Swing Guard LE.
 2. Product: Stanley Sentrex 3 Sensor systems at doors with motion sensors, which consists of:
 - a. Overhead safety sensor, Pozi Trac position encoder.
 - b. Detection sensors mounted on door stiles.
 - c. Other required cabling, logic board and brackets.
- D. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator with contrasting-colored, engraved message.

1. Configuration: Square push plate with 4-by-4-inch junction box.
 - a. Mounting: Recess mounted semiflush in wall.
2. Push-Plate Material: Stainless steel as selected by Architect from manufacturer's full range.
3. Message: "Push to Open."

G. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

2.7 ACCESSORIES

- A. Signage: As required by cited BHMA standard for type of door and its operation.
 1. Application Process: Decals.
 2. Provide sign materials with instructions for field application when operators are installed.

2.8 FABRICATION

- A. Factory fabricate automatic door operators to comply with indicated standards.
- B. Form aluminum shapes before finishing.
- C. Fabricate exterior components to drain condensation and water-passing joints within operator enclosure to the exterior.
- D. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match operator.
- E. Provide metal cladding, completely covering visible surfaces before shipment to Project site. Fabricate cladding with concealed fasteners and connection devices, with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion, and with allowance for thermal expansion at exterior doors.

2.9 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary, protective covering before shipping.
- B. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

2.10 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame preparation and reinforcements, and other conditions affecting performance of automatic door operators.
- B. Examine roughing-in for electrical systems to verify actual locations of power connections before automatic door operator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install automatic door operators in accordance with manufacturer's written instructions and cited BHMA standard for type of door operation and direction of pedestrian travel, including signage, controls, wiring, remote power units if any, and connection to building's power supply.
 - 1. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion.
 - 2. Install operators true in alignment with established lines and door geometry without warp or rack. Anchor securely in place.
- B. Power Connection: See Division 26 Sections for connection to electrical power distribution system.
 - 1. Electrical Contractor shall pull wire and provide all necessary conduit and boxes.
 - 2. Final connection shall be by automatic door operator Installer.
- C. Controls: Install activation and safety devices in accordance with manufacturer's written instructions and cited BHMA standard for operator type and direction of pedestrian travel. Connect control wiring in accordance with Division 26 sections low-voltage electrical power conductors and cables.
- D. Access-Control System: Connect operators to access-control system as specified in Division 28 sections for access control hardware devices.
- E. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.

3.3 ADJUSTING

- A. Adjust automatic door operators to function smoothly and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.
 - 1. Adjust operators on exterior doors for tight closure.
- B. After completing installation of automatic door operators, inspect exposed finishes on doors and operators. Repair damaged finish to match original finish.

- C. Readjust automatic door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).
- D. Occupancy Adjustment: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain automatic door operators.

END OF SECTION

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 designated on Drawings and scheduled.
 - 2. Glazing sealants and accessories.
 - 3. Glass with decorative film overlay (Glazing Films).

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.

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 SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Glass Samples: For each type of glass product other than clear monolithic vision glass, 12 inches square.
- D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- E. Product Certificates: For glass.

- F. Product Test Reports: For insulating glass and glazing sealants, for tests performed by a qualified testing agency.
 - 1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.
- G. Preconstruction adhesion and compatibility test report.
- H. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- B. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.
- C. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.7 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: For insulated or laminated glass types installed with glazing sealants, test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
 - 1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
 - 2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 - 3. Test no fewer than eight samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
 - 4. Schedule enough time for testing and analyzing results to prevent delaying the Work.
 - 5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.8 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.

1.9 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.

1.10 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: Five 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 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. Glass Design: Glass thickness designations indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites in the thickness designations indicated for various size openings, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the criteria noted:

1. Provide fully tempered glass in insulated units where required for safety 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: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.

- a. Wind Design Data: As indicated on Drawings.
 2. Design Snow Loads: As indicated on Drawings.
 3. Thickness of Patterned Glass: Base design of patterned glass on thickness at thinnest part of the glass.
 4. Probability of Breakage for Sloped Glazing: For glass surfaces sloped more than 15 degrees from vertical, design glass for a probability of breakage not greater than 0.001.
 5. 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, whichever is less.
 6. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- D. Safety Glazing: Where safety glazing is indicated and required, provide glazing that complies with 16 CFR 1201, Category II.
1. Provide safety glazing in all hazardous locations as defined and listed in the Ohio Building Code OBC 2017, Section 2406. The following is a general list of required safety glazing locations., it is not meant to be inclusive of all required locations:
 - a. Glazing in swinging doors
 - b. Glazing in sliding doors.
 - c. Glazing in panels adjacent to door openings within 24 inches of the opening edge up to 60 inches above the floor.
 - d. Glazing in panels with all of the following: bottom edge below 18 inches above the floor, top edge 36 inches above the floor, walking surface within 36 inches of the panel and overall area of panel is greater than 9 square feet.
- E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
 2. For laminated-glass lites, properties are based on products of construction indicated.
 3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 4. 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.
 5. 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.
 6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.
- F. Mockups: Build mockups to demonstrate aesthetic effects and to set quality standards for materials and execution.
1. Install glazing in mockups specified in Section 084113 "Aluminum-Framed Entrances and Storefronts" and Section 084413 "Glazed Aluminum Curtain Walls" to match glazing systems required for Project, including glazing methods.
 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

2.2 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: "Laminated Glazing Reference Manual" and "Glazing Manual."
 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
1. Minimum Glass Thickness for Exterior Lites: 6 mm.
 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- D. Strength: Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.3 GLASS PRODUCTS

- A. Refer to schedule at end of section for applicable glass products utilized on Project.
- B. 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.
- C. Heat-Strengthened Float Glass: ASTM C 1048, Kind HS (heat strengthened), Type I, Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear) or Class 2 (tinted) as indicated, Quality-Q3.
1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
- D. Ceramic-Coated Spandrel Glass: ASTM C 1048, Type I, Condition B, Quality-Q3.
- E. Silicon-Coated Spandrel Glass: ASTM C 1048, Type I, Condition C, Quality-Q3.

2.4 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on positive-pressure testing according to NFPA 257 or UL9, including the hose-stream test, and shall comply with NFPA 80.
 - 1. Fire-protection-rated glazing required to have a fire-protection rating of 20 minutes shall be exempt from the hose-stream test.
- B. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name; test standard; whether glazing is permitted to be used in doors or openings; if permitted in openings, whether or not glazing has passed the hose-stream test; whether or not glazing meets 450 deg. F temperature-rise limitation; and the fire-resistance rating in minutes.
- C. Fire-Protection-Rated Tempered Glass: 6-mm thickness, fire-protection rated tempered glass; and complying with 16 CFR 1201, Category II.
 - 1. Products: Subject to compliance with requirements, provide one of products listed in schedule, if applicable.
- D. Fire Protection-Rated Film Faced Ceramic Glazing: Clear, ceramic flat glass; 5-mm thickness; faced on one surface with a clear glazing film; and complying with 16 CFR 1201, Category II.
 - 1. Products: Subject to compliance with requirements, provide one of products listed in schedule, if applicable.
- E. Fire-Protection-Rated Laminated Ceramic Glazing: Laminated glass made from two plies of clear, ceramic glass; 8-mm total thickness; and complying with 16 CFR 1201, Category II.
 - 1. Products: Subject to compliance with requirements, provide one of products listed in schedule, if applicable.

2.5 FIRE-RESISTANCE-RATED GLAZING

- A. Fire-Resistance-Rated Glazing: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-resistance ratings indicated, based on testing according to ASTM E 119 or UL 263.
- B. Fire-Resistance-Rated Glazing Labeling: Permanently mark fire-resistance-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, that the glazing is approved for use in walls, and the fire-resistance rating in minutes.
- C. Fire Resistance Laminated Glass with Intumescent Interlayers: Laminated glass made from multiple plies of uncoated, clear float glass; with intumescent interlayers; and complying with 16 CFR 1201, Category II.
 - 1. Products: Subject to compliance with requirements, provide one of the products listed in schedule, if applicable.

2.6 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.
- B. Interlayer: Structural polyvinyl butyral or ionomeric polymer interlayer.
 - 1. Manufacturer:
 - a. Dupont: SentryGlas
 - b. Eastman: Saflex DG41
 - 2. Construction: Laminate glass with polyvinyl butyral interlayer to comply with interlayer manufacturer's written instructions.
 - 3. Interlayer Thickness: Provide thickness not less than that indicated and as needed to comply with requirements.
 - 4. Interlayer Color: Clear unless otherwise indicated.

2.7 INSULATING GLASS, IG-X

- 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 polyisobutylene and silicone primary and secondary sealants.
 - 2. Spacer Manufacturer/Model: Provide manufacturer's standard corner construction. No aluminum, foam or all thermoplastic spaces are permitted.
 - a. TechnoForm Glass Insulation: TGI spacer, light gray.
 - b. Roll Tech: Chromatech Ultra, light gray.
 - c. Thermix: Thermix TX-N Plus, light gray.
 - d. Viracon: VTS Viracon Thermal Spacer, standard black matte.
 - 3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.8 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Nonstaining silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
 - 1. Subject to compliance with requirements provide one of the following:
 - a. Dow Corning Corporation; 795.

- b. GE Silicones; SilPruf NB.
 - c. Pecora Corporation; 895NST.
 - d. Tremco Incorporated, Spectrum 2.
2. Color: Black.
- C. Glazing Sealants for Fire-Resistive and Fire Protective Glazing Products: Identical to products used in test assemblies to obtain fire-protection rating.

2.9 GLAZING ACCESSORIES

- 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.
- 1. Fire-Resistive and Fire-Protective Products; Approved by testing agencies that listed and labeled fire resistive and fire protective glazing products with which products are used for applications and ratings indicated. Comply with manufacturer's requirements.
- B. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
- 1. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 - 2. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- C. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
- 1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 - 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.
- D. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- E. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- F. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- G. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- H. 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.
- I. Perimeter Insulation for Fire Resistance Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.10 GLAZING FILM

- A. Decorative Film Overlay (Glazing Films): Translucent, dimensionally stable, cast PVC film, 2-mil minimum thickness, with pressure-sensitive, clear adhesive back for adhering to glass and releasable protective backing.
- B. Manufacturer/Product: Subject to compliance with requirements, provide the following:
 - 1. Glazing Film Type GF-1: 3M Fasara Glass Finishes Graduation SH2SSIM-W, Ilumina Silky-W, 1270 mm by 2950 mm.
 - 2. Glazing Film Type GF-2: LLumar Dot Matrix Gradient, 60 inches.
 - 3. Refer to Drawings for locations.

2.11 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
 - 1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
 - a. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.
- D. Decorative Film Overlay (Glazing Films): Apply squarely aligned to glass edges, uniformly smooth, and free from tears, air bubbles, wrinkles, and rough edges, according to manufacturer's written instructions, including surface preparation and application temperature limitations and as follows for various film types:
 - 1. In single sheet completely overlaying the back face of clean glass.
 - 2. In patterns when indicated on the Drawings.
 - 3. With graphic images when indicated on the Drawings.
 - 4. Glazing Films with gradient patterns are to be installed from the top of the pattern down. Film trimmed from the installation is to be from the bottom of the 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.

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.

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 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.

1. For fire rated glazing, place coatings or film facing fire side.

- 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.
- L. Glazing Film: When utilized install glazing film per manufacturers installation instructions.

3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- G. Fire resistive and Fire Protective Glazing: Install tapes and sealants per manufacturer's instructions.

3.5 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.

3.6 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.

3.7 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.

3.8 GLASS SCHEDULE

- A. See attached schedule.

END OF SECTION

Glass Schedule [IG-1 and IG-2 are listed as the common glass type, clear glass with Solarban 60, and it's equals. Edit per your projects glass types]

	Ext. Glass Type (IG-#)	Fire Rating (minutes)	Thickness	Description/Application	Manufacturer/Product	Insulated Unit Info			Description	
						Visible %	Winter U Value	Solar Heat Gain Coefficient		
Exterior	IG-1	NA	1"	Insulated/Exterior	Vitro	SOLARBAN 60 (2) Clear + Clear	70	0.29	0.39	Vitro Clear w/ Solarban 60 Low-E Coating on #2 surface (Outboard Lite), Argon filled airspace, Vitro Clear (inboard Lite).
					Guardian	SN 68 (2) Clear + Clear	68	0.25	0.37	Sunguard Clear w/ SN 68 Low-E Coating on #2 surface (Outboard Lite), Argon filled airspace, Sunguard Clear (inboard Lite).
					Viracon	VE1-2M, VE-2M (2) Clear + Clear	70	0.30	0.38	Viracon Clear w/ VE-2M Low-E Coating on #2 surface (Outboard Lite), Argon filled airspace, Viracon Clear (inboard Lite).
	IG-2	NA	1"	Insulated Spandrel/Exterior	Vitro	SOLARBAN 60 (2) Clear + Clear w/ custom color opacifier on #4	na	0.29	0.27	Vitro Clear w/ Solarban 60 Low-E Coating on #2 surface (Outboard Lite), Argon filled airspace, Vitro Clear w/ ICD OPACI-COAT 300 on #4 surface (Inboard Lite).
					Guardian	SN 68 (2) Clear + Clear w/color ceramic frit on #4	na	0.25	0.37	Sunguard Clear w/ SN 68 Low-E coating on #2 surface (Outboard Lite), Argon filled airspace, Sunguard Clear w/color ceramic frit on #4 surface (Inboard Lite).
					Viracon	VE1-2M, VE-2M (2) w/color ceramic frit on #4	na	0.30	0.38	Viracon Clear w/VE-2M Low-E coating on #2 (outboard lite), Argon Filled air space, ViraconClear w/V957 Subdued Gray Viraspan #4 (Inboard light)
	IG-3	NA	1"	Insulated/Exterior	Vitro	Clear + Clear				Exterior vestibule doors
					Guardian					
					Viracon					
IG-4	NA	1"	Insulated / Exterior	Vitro						
				Guardian						
				Viracon						
Interior		NA	1/4"	Clear Fully Tempered						
		NA	1/2"	Clear Fully Tempered						
		20		Fire Protection Rated (FPR Glazing - 1) (Tempered Safety)	Technical Glass Products SAFTI First Vetrotech Saint-Gobain	Fireglass 20 Superlite I SSG PyroSwiss US				20 Minute rating for use in doors in Smoke Barriers, 1 hr corridor fire partitions.
		45 to 180		Fire Protection Rated (FPR Glazing - 2) (Filmed Ceramic)	Technical Glass Products SAFTI First Schott North America Vetrotech Saint-Gobain	FireLite NT Pyran Platinum F Pyran Platinum F SSG Keralite FR-F				
		45 to 180		Fire Protection Rated (FPR Glazing - 3) (Laminated Ceramic)	Technical Glass Products SAFTI First Schott North America Vetrotech Saint-Gobain	FireLite Plus Pyran Platinum L Pyran Platinum L SSG Keralite FR-L				
		60 to 240		Fire Resistance Rated (Laminated Intumescent)	Technical Glass Products (Pilkington) SAFTI First Vetrotech Saint-Gobain	Pyrostop SuperLite II-XL SSG Contraflam				

Notes:

- 1) For Insulated units, provide fully tempered glass where required for safety glazing.
- 2) For glazing types in interior doors and interior door frames containing sidelights or transoms, refer to Door & Frames Schedule/Details drawing.
- 3) For glazing types in all other interior frames, refer to Floor Plans and A7 Series.
- 4) For glazing types in exterior doors and exterior frames/windows, refer to Exterior Elevations and Exterior Frame Types drawing.

SECTION 089119

FIXED LOUVERS

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. Fixed extruded-aluminum louvers.
 - 2. Blank-off panels for louvers

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. Horizontal Louver: Louver with horizontal blades (i.e., the axis of the blades are horizontal).
- C. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- D. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven-rain performance, as determined by testing according to AMCA 500-L.

1.4 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
 - 1. Show weep paths, gaskets, flashings, sealants, and other means of preventing water intrusion.
 - 2. Show mullion profiles and locations.
- D. Samples: For each type of metal finish required.

- E. Sample Warranties: For manufacturer's special warranties.

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.6 WARRANTY

- A. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.
 - 1. Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Delta E units when tested according to ASTM D2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fixed louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design louvers, including comprehensive engineering analysis by a qualified professional engineer, using structural performance requirements and design criteria indicated.
- B. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
 - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- C. Seismic Performance: As indicated on drawings.
- D. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

- F. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

2.3 FIXED EXTRUDED-ALUMINUM LOUVERS

A. Horizontal Drainable-Blade Louver:

1. Products: Subject to compliance with requirements, provide one of the following products:
 - a. Construction Specialties, Inc. Model A6097.
 - b. Greenheck Fan Corporation, Model ESD-635.
 - c. Industrial Louvers Inc. Model 653XP.
2. Louver Depth: 6 inches
3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
4. Mullion Type: Exposed.
5. Louver Performance Ratings:
 - a. Free Area: Not less than 8.3 sq. ft. for 48-inch- wide by 48-inch- high louver.
 - b. Point of Beginning Water Penetration: Not less than 1190 fpm.
 - c. Air Performance: Not more than 0.15-inch wg static pressure drop at 950-fpm free-area intake velocity.
6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

2.4 LOUVER SCREENS

A. General: Provide screen at each exterior louver.

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type: Bird screening

B. Secure screen frames to louver frames with stainless-steel machine screws spaced a maximum of 6 inches from each corner and at 12 inches o.c.

C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
2. Finish: Mill finish unless otherwise indicated.
3. Type: Non-rewireable, U-shaped frames.

D. Louver Screening for Aluminum Louvers:

1. Bird Screening: Aluminum, 1/2-inch- square mesh, 0.063-inch wire.

2.5 BLANK-OFF PANELS

A. Insulated Blank-Off Panels: Laminated panels consisting of an insulating core surfaced on back and front with metal sheets and attached to back of louver.

1. Thickness: 2 inches.

2. Metal Facing Sheets: Aluminum sheet, not less than 0.032-inch nominal thickness.
3. Insulating Core: Extruded-polystyrene foam.
4. Edge Treatment: Trim perimeter edges of blank-off panels with louver manufacturer's standard extruded-aluminum-channel frames, not less than 0.080-inch nominal thickness with corners mitered and with same finish as panels.
5. Seal perimeter joints between panel faces and louver frames with gaskets or sealant.
6. Panel Finish: Same finish applied to louvers.
7. Attach blank-off panels with clips.

2.6 MATERIALS

- A. Aluminum Extrusions: ASTM B221, Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B209, Alloy 3003 or 5005, with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
 1. Use Phillips flat-head screws for exposed fasteners unless otherwise indicated.
 2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
 3. For fastening galvanized steel, use hot-dip-galvanized-steel or 300 series stainless-steel fasteners.
 4. For fastening stainless steel, use 300 series stainless-steel fasteners.
 5. For color-finished louvers, use fasteners with heads that match color of louvers.
- D. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, fabricated from stainless-steel components, 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 according to ASTM E488/E488M conducted by a qualified testing agency.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.7 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
 1. Continuous Vertical Assemblies: Fabricate units without interrupting blade-spacing pattern unless horizontal mullions are indicated.
- C. Maintain equal louver blade spacing, including separation between blades and frames at head and sill, to produce uniform appearance.
- D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
 1. Frame Type: Channel unless otherwise indicated.

- E. Include supports, anchorages, and accessories required for complete assembly.
- F. Provide vertical mullions of type and at spacings indicated, but not more than is recommended by manufacturer, or 72 inches o.c., whichever is less.
 - 1. Fully Recessed Mullions: Where indicated, provide mullions fully recessed behind louver blades. Where length of louver exceeds fabrication and handling limitations, fabricate with close-fitting blade splices designed to permit expansion and contraction.
 - 2. Exterior Corners: Prefabricated corner units with mitered and welded blades and with fully recessed mullions at corners.
- G. Provide subsills made of same material as louvers for recessed louvers.
- H. Join frame members to each other and to fixed louver blades with fillet welds concealed from view, unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

2.8 ALUMINUM FINISHES

- A. Finish louvers after assembly.
- B. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2605 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 1. Color and Gloss: As indicated by manufacturer's designations. TBD.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, 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. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.

- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. 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 replace with new units.
 - 1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION

SECTION 091001
FLOOR PREPARATION

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 hydraulic cement floor underlayments:
 - 1. Self-leveling underlayment.
 - 2. Trowelable underlayment.
 - 3. Fill underlayment.
 - 4. Moisture control systems.
 - 5. Floor substrate testing.
 - 6. Floor substrate preparation and remediation.

1.3 SUBMITTALS

- A. Product Data: Submit manufacturers product data and installation instructions for each type of product indicated.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Test Reports: Submit field test reports, with location of test indicated for the following;
 - 1. Concrete slab moisture vapor transmission rate.
 - 2. Concrete slab alkalinity.
 - 3. Concrete slab absorption (porosity).
- D. Qualification Data: For Installer.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Installer must be approved by manufacturer for application of underlayment products required for this Project.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

03-18/08-21

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
 - 1. Place hydraulic-cement-based underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F.

1.7 COORDINATION

- A. Coordinate application of underlayment with requirements of floor-covering products and adhesives, to ensure compatibility of products.
- B. Preinstallation Conference: Conduct conference at project site coordinated with the various floor-covering products Preinstallation Conference.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 HYDRAULIC CEMENT SELF LEVELING UNDERLAYMENTS (Self Leveling Underlayment)

- A. Self Leveling Underlayment: Polymer-modified, self-leveling, hydraulic-cement product that can be applied in minimum uniform thickness of 1/4 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Ardex; K-15 or V1200 Self-Leveling Underlayment Concrete.
 - b. Dependable Chemical Co., Inc.; Skimflow ES.
 - c. Euclid Chemical Company (The); Flo-Top.
 - d. MAPEI Corporation; Ultraplan 1 Plus.
 - 2. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
 - 3. Compressive Strength: Not less than 4150 psi at 28 days when tested according to ASTM C 109/C 109M.
 - 4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.

2.3 HYDRAULIC CEMENT TROWELABLE UNDERLAYMENTS (Trowelable Underlayment)

- A. Trowelable Underlayment: Polymer-modified, trowelable, hydraulic-cement product that can be applied to a maximum uniform thickness of 1/2 inch and that can be feathered at edges to match adjacent floor elevations.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Ardex; SKM or Feather Finish.
 - b. Dependable Chemical Co., Inc.; Skimcrete XL.
 - c. Euclid Chemical Company; Tamms Thin Patch
 - d. MAPEI Corporation; Planipatch.
 2. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
 3. Compressive Strength: Not less than 3,500 psi at 28 days when tested according to ASTM C 109/C 109M.
 4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.

2.4 HYDRAULIC CEMENT FILL UNDERLAYMENTS (Fill Underlayment)

- A. Fill Underlayment and Patching Compound: Polymer-modified, trowelable, hydraulic-cement product that can be applied in minimum uniform thickness of 3/8 inch up to 1-inch level with feathered edges. Product can fill voids or be sloped up to 3 inches with use of aggregate.
1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Ardex; SD-P
 - b. Dependable Chemical Co., Inc.; Skimcrete CP.
 - c. Euclid Chemical Company; Tammspatch II
 - d. MAPEI Corporation; Mapecem Quickpatch.
 2. Cement Binder: ASTM C 150, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C 219.
 3. Compressive Strength: Not less than 3500 psi at 28 days when tested according to ASTM C 109/C 109M.
 4. Underlayment Additive: Resilient-emulsion product of underlayment manufacturer, formulated for use with underlayment when applied to substrate and conditions indicated.

2.5 MOISTURE CONTROL SYSTEMS

- A. The following products can be used for floor finish installations when concrete substrates relative humidity (ASTM F 2170) exceeds what is allowed by flooring manufacturers requirements.
1. The following two products would not be used if the concrete porosity inhibiting admixture or moisture vapor reduction admixture has been included in the concrete mix.
- B. Underlayment Moisture Control System: Two-part 100% solids epoxy moisture control coating provided by or recommended by the underlayment manufacturer to act as a vapor retarder over new concrete slabs.

1. Product to meet ASTM F3010 – Standard Practice for Two-Component Resin-Based Membrane Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings.
 - a. These epoxy systems can be used when concrete is testing at RH 100% (ASTM 2170).
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Ardex; Ardex MC Rapid.
 - b. Dependable Chemical Co., Inc.; Vaporseal HM.
 - c. MAPEI Corporation; Planiseal VS.
 3. Permeability: less than 0.1 perms at greater than or equal to 12 mils DFT per ASTM E96 -05.
 4. Reduction of Moisture Vapor: Greater than 96% per ASTM E96-05 (12 mils DFT).
 5. Pull-Off Adhesion/Bond Strength: Greater than 1000psi with failure in concrete substrate (at 28 days per ASTM D7234).
- C. Underlayment Moisture Control System: One-component polyurethane moisture control resin system provided by or recommended by the Underlayment manufacturer to act as a vapor retarder over new or existing concrete.
1. These polyurethane systems can be used when concrete is testing at RH 95% (ASTM 2170).
 2. Products: Subject to compliance with requirements, provide one of the following:
 - a. Ardex; Ardex PU 50.
 - b. MAPEI Corporation; Planiseal PMB
 3. Reduction of Moisture Vapor: Greater than 96% per ASTM E96-05 (12 mils DFT).
 4. Pull-Off Adhesion/Bond Strength: Greater than 1000psi with failure in concrete substrate (at 28 days per ASTM D7234).

2.6 ACCESSORIES

- A. Aggregate (For Self-Leveling Underlayment and Fill Underlayments): Well-graded, washed gravel, 1/8 to 1/4 inch; or coarse sand as recommended by underlayment manufacturer.
1. Provide aggregate when recommended in writing by underlayment manufacturer for underlayment thickness required.
- B. Water: Potable and at a temperature of not more than 70 deg F.
- C. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
1. Primer products are to be determined and approved by manufacturer for specific concrete substrates that are either absorbent or are determined to be non-porous.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance.

03-18/08-21

1. Proceed with application only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. General: Prepare and clean substrate according to manufacturer's written instructions.

1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
2. Fill substrate voids to prevent underlayment from leaking.

B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Mechanically 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.
 - a. Shotblast areas with contaminants or use another manufacturer approved method that is done per the International Concrete Repair Institute Guideline ICRI No. 312.R2.2013.
 - b. Removal must be deep enough to eliminate all penetrated contaminants down to sound, solid concrete.
 - c. Moisture Control Systems:
 - 1) Preparation of surface must obtain a minimum ICRI concrete surface profile of 3 (CSP 3) unless moisture control systems allows a lower CSP.
3. Alkalinity and Adhesion Testing: Perform tests recommended by resilient flooring manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 7 or more than 9 pH.
4. Moisture Testing: Proceed with installation only after substrates pass testing according to resilient sheet flooring manufacturer's written recommendations, but not less stringent than the following (Note that the two following tests are not required if concrete porosity inhibiting admixture or moisture vapor reduction admixture is used):
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1,000 sq. ft. in 24 hours.
 - b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level, at ¼ slab depth.
5. Absorption (Porosity) Testing: Concrete substrates are to be tested to establish the substrates water absorption (porosity). This assessment will allow the determination of appropriate surface preparation and which of the manufacturer's primers are to be utilized.
 - a. Test for porosity per ASTM F3191.
 - b. Extremely absorbent concrete may require two applications of primer per manufacturer's instructions.
 - c. Concrete treated with admixtures may be non-porous. Prepare surfaces according to manufacturer's written instructions and provide manufacturer's recommended primer.

- C. Remove existing flooring, including underlayments, and setting beds (where applicable) to expose a sound substrate. Grind substrates if required to thoroughly remove any traces of the floor material adhesive or other foreign material.
- D. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

3.3 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
 - 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
 - 2. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
 - 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
 - a. Any joint that will move, expansion and isolation joints, must be honored/kept clear and sealed with backer rod and flexible sealant after installation of the topping underlayment system.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Underlayment Moisture Control System: Mix the two-part system resin and hardener, when applicable, and apply over prepared substrate per manufacturer's instructions.
 - 1. Follow manufactures instructions for cracks and joints. Prefill cracks with manufacturers recommended products that are wider than what the moisture control coating is to fill.
 - 2. Apply manufactures recommended sand broadcast, per manufacturer's instructions, as required for underlayment products and thicknesses that are to be placed over the Moisture Control System.
- D. Self-Leveling Underlayments: Apply to produce a uniform, level surface.
 - 1. Apply a final layer without aggregate to product surface, when aggregate is used to achieve slope and thickness using self-leveling underlayment.
 - 2. Feather edges to match adjacent floor elevations.
 - 3. Provide sloped underlayment at drains and where indicated.
- E. Trowelable Underlayments: Apply to produce a uniform, level surface, except where indicated to be sloped.
 - 1. Apply trowelable modified cementitious underlayment where required to correct subfloor irregularities and floor depressions greater than a 1/8 in gap under a 10 ft. straightedge.
 - 2. Feather edges to match adjacent floor elevations.
 - 3. Apply cementitious underlayment at transition edge between resilient flooring and dissimilar flooring materials to allow for a "flush" transition. The slope of the underlayment shall provide for a gradual transition to the thicker flooring material.
 - 4. Trowelable underlayment shall be steel troweled smooth and sanded. Trowel marks showing through installed flooring shall be reason to remove flooring and sand out trowel marks.
 - 5. Provide sloped underlayment at drains and where indicated.

- F. Fill Underlayments: Apply to fill voids exceeding 1/2-inch-deep in concrete substrates or to produce a uniform, level surface exceeding 1/2 inch deep.
 - 1. Apply a final layer without aggregate to product surface, when aggregate is used to achieve slope and thickness using fill underlayment.
 - 2. Feather edges to match adjacent floor elevations.
 - 3. Trowelable underlayment shall be steel troweled smooth and sanded. Trowel marks showing through installed flooring shall be reason to remove flooring and sand out trowel marks.
 - 4. Provide sloped underlayment at drains and where indicated.
- G. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- H. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- I. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.4 PROTECTION

- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

END OF SECTION

SECTION 092116.23

GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes gypsum board shaft-wall assemblies for the following:
 - 1. Vertical mechanical chase enclosures.

1.3 SUBMITTALS

- A. Product Data: For each component of gypsum board shaft wall assembly.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

1.4 PREINSTALLATION MEETING

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures for installing gypsum board shaft-wall assemblies including, but not limited to, the following:
 - 1. Fasteners proposed for anchoring nonstructural steel framing to building structure.
 - 2. Sprayed fire-resistive materials applied to structural steel framing.
 - 3. Elevator equipment, including hoistway doors, elevator call buttons, and elevator floor indicators.
 - 4. Wiring devices in shaft-wall assemblies.
 - 5. Doors and other items penetrating shaft-wall assemblies.
 - 6. Items supported by shaft-wall-assembly framing.
 - 7. Mechanical work enclosed within shaft-wall assemblies.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.
- C. Stack panels flat on leveled supports off floor or slab to prevent sagging.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or with gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Provide materials and construction identical to those of assemblies with fire-resistance ratings determined according to ASTM E 119 by a testing and inspecting agency.
- B. Sound Control Partitions: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.
- C. Horizontal Deflection:
 - 1. For composite and non-composite wall assemblies, limited to L/240 of the wall height based on horizontal loading of 7.5 lbf/sq. ft.
 - 2. For composite and non-composite wall assemblies with applied ceramic tile, limited to L/360 of the wall height based on horizontal loading of 7.5 lbf/sq. ft.

2.2 GYPSUM BOARD SHAFT-WALL ASSEMBLIES, GENERAL

- A. Provide materials and components complying with requirements of fire-resistance-rated assemblies indicated.
 - 1. Provide panels in maximum lengths available to eliminate or minimize end-to-end butt joints.
 - 2. Provide auxiliary materials complying with gypsum board shaft-wall assembly manufacturer's written recommendations.

2.3 PANEL PRODUCTS

- A. Gypsum Shaftliner Board: Comply with ASTM C 442, C1396.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Georgia-Pacific Building Products.
 - c. National Gypsum Company.

- d. USG Corporation.
- 2. Type X: Manufacturer's proprietary fire-resistive liner panels with paper faces.
 - a. Core: 1 inch thick.
 - b. Long Edges: Double beveled.
- 3. Moisture- and Mold-Resistant Type X: Manufacturer's proprietary liner panels fire-resistive liner panels with ASTM D3273 mold-resistance score of 10 as rated according to ASTM D3274.
 - a. Core: 1 inch thick.
 - b. Long Edges: Double beveled.
- B. Gypsum Board Finish Panels: As specified in Division 09 Section "Gypsum Board."
- C. Tile Backing Board Panels: As specified in Division 09 Section "Gypsum Board."

2.4 NON-LOAD-BEARING STEEL FRAMING

- A. Framing Members: Comply with ASTM C 754 for conditions indicated.
- B. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated and complying with requirements for fire-resistance-rated assembly indicated.
 - 1. Protective Coating: Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40, hot-dip galvanized, unless otherwise indicated
- C. Studs: Manufacturer's standard profile for repetitive, corner and end members, and fire-resistance-rated assembly indicated.
 - 1. Depth: As indicated.
 - 2. Minimum Base-Metal Thickness: Manufacturer's standard thicknesses that comply with structural performance requirements for stud depth indicated, but not less than 0.033 inch.
- D. Runner Tracks: Manufacturer's standard J-profile track with long-leg length as standard with manufacturer, but at least 2 inches long and in depth matching studs.
 - 1. Minimum Base-Metal Thickness: Matching steel studs.
- E. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
- F. Elevator-Hoistway-Entrance Struts: Manufacturer's standard J-profile jamb strut with long-leg length of 3 inches, in depth matching studs, and not less than 0.033 inch thick.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced product standards and manufacturer's written recommendations.

- B. Trim Accessories: Cornerbead, edge trim, and control joints of material and shapes specified in Division 09 Section "Gypsum Board" that comply with gypsum board shaft-wall assembly manufacturer's written recommendations for application indicated.
- C. Gypsum Board Joint-Treatment Materials: As specified in Division 09 Section "Gypsum Board."
- D. Laminating Adhesive: Adhesive or joint compound recommended by manufacturer for directly adhering gypsum face-layer panels and gypsum-base face-layer panels to backing-layer panels in multilayer construction.
- E. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- F. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of track, fasteners, or structural substrates in which anchors are embedded.
 - 1. 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.
 - 2. 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.
- G. Reinforcing: Galvanized-steel reinforcing strips with 0.033-inch minimum thickness of base metal (uncoated).
- H. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing), produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- I. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."
- J. Acoustical Putties: Nonhardening, non-corrosive, water-resistant, acoustical putties containing no solvents or inorganic fibers.
- K. Gypsum Board Cants:
 - 1. Gypsum Board Panels: As specified in Division 09 Section "Gypsum Board," Type X, 1/2- or 5/8-inch panels.
 - 2. Adhesive: Laminating adhesive as specified in Division 09 Section 09 "Gypsum Board."
 - 3. Non-Load-Bearing Steel Framing: As specified in Division 09 Section 09 "Non-Structural Metal Framing."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut, with Installer present, including hollow-metal frames, elevator hoistway door frames, cast-in anchors, and

structural framing. Examine for compliance with requirements for installation tolerances and other conditions affecting performance.

- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install gypsum board shaft-wall assemblies to comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and the following:
 - 1. ASTM C 754 for installing steel framing except comply with framing spacing indicated.
 - 2. Division 09 Section "Gypsum Board" for applying and finishing panels.
- B. Do not bridge architectural or building expansion joints with shaft-wall assemblies, frame both sides of expansion joints with furring and other support.
- C. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
 - 1. Elevator Hoistway: At elevator hoistway-entrance door frames, provide jamb struts on each side of door frame.
 - 2. Reinforcing: Provide galvanized steel reinforcing strip where handrails and other items attach directly to shaft-wall assemblies. Accurately position and secure behind at least one layer of face panel.
- D. Integrate stair hanger rods with gypsum board shaft-wall assemblies by locating cavity of assemblies where required to enclose rods.
- E. Penetrations: At penetrations in shaft wall, maintain fire-resistance rating of shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons and floor indicators, and similar items.
- F. Isolate perimeter of gypsum panels from building structure to prevent cracking of panels, while maintaining continuity of fire-rated construction.
- G. Firestop Tracks: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
- H. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect, while maintaining fire-resistance rating of gypsum board shaft-wall assemblies.
- I. Sound-Rated Shaft Wall Assemblies: Seal gypsum board shaft walls with acoustical sealant at perimeter of each assembly where it abuts other work and at joints and penetrations within each assembly.
 - 1. Install acoustical sealant to withstand dislocation by air-pressure differential between shaft and external spaces; maintain an airtight and smoke-tight seal; and comply with ASTM C 919 requirements or with manufacturer's written instructions, whichever are more stringent.

2. Install acoustical putty sheet products at electrical device boxes, ductwork and any other penetration locations that require an airtight, smoke-tight and acoustical seal. Install per manufacturer's instructions.
- J. Gypsum Board Cants: At projections into shaft exceeding 4 inches and where indicated, install gypsum board cants covering tops of projections.
1. In elevator shafts where gypsum board shaft-wall assemblies cannot be positioned within 4 inches of the shaft face of structural beams, floor edges, and similar projections into shaft, install gypsum board cants covering tops of projections.
 - a. No recesses allowed in the interior plane of the shaft due to steel beam profiles
 2. Slope cant panels at least 75 degrees from horizontal. Set base edge of panels in adhesive and secure top edges to shaft walls at 24 inches o.c. with screws fastened to shaft-wall framing.
 3. Where non-load bearing steel framing is required to support gypsum board cants, install framing at 24 inches o.c. and extend studs from the projection to shaft-wall framing.
- K. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.3 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, or mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, and irregular shape.
 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 092216

NON-STRUCTURAL METAL FRAMING

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. Non-load-bearing steel framing systems for interior partitions.
2. Pony Wall Support Framing
3. Extruded Aluminum Partition Closure for partition wall terminations.
4. Suspension systems for interior ceilings and soffits.
5. Grid suspension systems for gypsum board ceilings.

B. Related Requirements:

1. Section 092900 "Gypsum Board Shaft Wall Assemblies" for non-load-bearing metal shaft-wall framing, gypsum panels, and other components of shaft-wall assemblies.

1.3 SUBMITTALS

A. Product Data: Manufacturers technical literature for each type of product and system indicated.

1. Include manufacturers specifications for materials, construction details and installation instructions.
2. For embossed stud products, provide manufacturers limiting height tables for the stud framing being used and highlight the studs being proposed.

B. Sustainable Design (LEED) Submittals: Refer to Section 018113 and comply with requirements when applicable.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E119 by an independent testing agency.

B. Sound Control Partitions: For sound control assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings, according to ASTM E90 and classified according to ASTM E413 by an independent testing agency.

- C. Horizontal Deflection:
 - 1. For composite and non-composite wall assemblies, limited to L/240 of the wall height based on horizontal loading of 5 lbf/sq. ft.
 - 2. For composite and non-composite wall assemblies with applied ceramic tile, limited to L/360 of the wall height based on horizontal loading of 5 lbf/sq. ft.

- D. Steel Stud Manufacturers Association (SSMA): Conventional metal stud designations, stud and track section properties, limiting wall heights, bracing requirements and other requirements are to be based on the SSMA Technical Guide as well as requirements adopted by the Authority Having Jurisdiction and the stud and track manufacturers product data.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with AISI S220 and ASTM C645, Section 10 requirements for steel unless otherwise indicated.
 - 2. Protective Coating: ASTM A653/A653M, G40 (Z120) hot-dip galvanized unless otherwise indicated.
 - a. Coating with equivalent corrosion resistance of ASTM A 653/A 653M, G40 (Z120) or Clark Dietrich DiamondPlus® coating; roll-formed from steel meeting mechanical and chemical requirements of ASTM A 1003 with a zinc-based coating are acceptable. Galvannealed products are not acceptable.
 - 1) Coatings shall demonstrate equivalent corrosion resistance with an evaluation report acceptable to the authorities having jurisdiction.
 - b. Provide G60 (Z180) for structural designated framing.
 - 3. Definitions - The following are to aid in the use of this specification. Refer to metal framing manufactures definitions and requirements and with the SFIA or SSMA definitions and requirements for wall assembly design.
 - a. Composite Wall Assemblies – Gypsum Board, 5/8-inch Type X, installed full height on both sides steel stud and track framing.
 - b. Non-Composite Fully Braced Wall Assemblies – Gypsum Board, 5/8-inch Type X, installed on steel stud and track framing.
 - 1) Gypsum board installed only to ceiling height on both sides with horizontal bracing as required through the framing above the gypsum board.
 - 2) Gypsum board installed full height one side and ceiling height on the other with horizontal bracing as required.
 - c. Non-Composite Braced at 48” o.c. Wall Assemblies – Gypsum Board, 5/8-inch Type X, installed full height on one side of steel stud and track framing. Framing to have horizontal bracing at 48 inches on center with horizontal bracing maximum 12 inches from the top of the assembly.

- B. Studs and Tracks: AISI S220 and ASTM C645, Section 10. Use either conventional steel studs and tracks or embossed, high-strength steel studs and tracks as follows:
 - 1. Conventional Steel Studs and Tracks:

- a. Manufacturers: Subject to compliance with requirements, available manufacturers offering products may be incorporated into the work.
 - b. Typical Minimum Base-Steel Thickness: 0.0296 inch (30 mil, 33 ksi) unless horizontal deflection performance requires greater thickness.
 - 1) Structural Studs: Provide 0.0329-inch (33 mil, 33 ksi) or 0.0428-inch (43 mil, 33 ksi) studs at locations where indicated on Drawings and as required for horizontal deflection requirements.
 - c. Flange Size: 1-1/4 inches for 30 and 33 mil, minimum 1-3/8 inches for 43 mil.
 - d. Web Depth: As indicated on Drawings.
 - e. Maximum Spacing: 16 inches on center, unless noted otherwise.
2. Embossed Steel Studs and Tracks: Roll-formed and embossed with surface deformations to stiffen the framing members matching conventional ASTM C645 steel studs and tracks.
- a. Manufacturers/Products: Subject to compliance with requirements provide products by one of the following:
 - 1) Clark Dietrich; ProSTUD 30 (30 mil., 33 ksi).
 - 2) MarinoWARE; Viper 30 (30 mil., 33 ksi).
 - 3) Telling Industries; Viper 30 (30 mil., 33 ksi).
 - b. Flange Size: 1-1/4 inches.
 - c. Web Depth: As indicated on Drawings.
 - d. Maximum Spacing: 16 inches on center, unless noted otherwise.
3. Embossed Steel Studs and Tracks, Equivalent Gage: Roll-formed and embossed with surface deformations to stiffen the framing members so that they are structurally comparable to conventional ASTM C645 steel studs and tracks.
- a. Contractor is to verify that proposed wall assemblies meet manufacturers limiting wall heights per listed requirements and manufacturers definitions and requirements for stud and track thickness proposed for use.
 - b. Manufacturers/Products: Subject to compliance with requirements provide products by one of the following:
 - 1) Clark Dietrich; ProSTUD 20 EQ (18 mil., 70 ksi).
 - 2) MarinoWARE; Viper 20 EQ (18 mil., 70 ksi).
 - 3) Telling Industries; Viper 20 EQ (18 mil., 70 ksi).
 - c. Minimum Base-Steel Thickness: 0.0181-inch (18 mil.) unless horizontal deflection performance requires greater thickness.
 - 1) Minimum Design Thickness: 0.0190 inch.
 - d. Flange Size: 1-1/4 inches.
 - e. Web Depth: As indicated on Drawings.
 - f. Maximum Spacing: 16 inches on center.
- C. Slip-Type Head Joints: Typical at all Wall Assemblies unless indicated otherwise. Provide the following:
1. Single Long-Leg Track System: AISI S220 top track with 2-inch- deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top track and with continuous

bridging, at Non-Composite walls, located within 12 inches of the top of studs to provide lateral bracing.

- D. Flat Strap and Backing Plate (Strap Backing Plate): Steel sheet for blocking and bracing in length and width indicated.
 - 1. Reinforcing for wall mounted items:
 - a. Minimum Base-Steel Thickness: 0.0428 inch (18 Ga.) unless noted otherwise.
 - 2. Reinforcing for wall protection, handrails, wall guards and where noted:
 - a. Minimum Base Metal Thickness: 0.0538 inch. (16 Ga.).
 - b. Width: 6 inches; provide 8 inches for low wall guard applications.
 - c. Mount at height required by details.
 - 3. Reinforcing for cabinets, casework and where noted:
 - a. Minimum Base Metal Thickness: 0.067 inch. (14 Ga.).
 - b. Width: 6 inches.
 - c. Mount at height required by details.
- E. Cold-Rolled Channel Bridging: Use the bridging channels that correspond with the steel stud and track system that is being used.
 - 1. Conventional Steel Studs and Tracks – Steel U-Channel, 0.0538-inch minimum base-steel thickness, with minimum 1/2-inch- wide flanges.
 - a. Depth: 1-1/2 inches.
 - b. Clip Angle: Not less than 1-1/2 by 1-1/2 inches, 0.068-inch- thick, galvanized steel.
 - 2. Embossed Steel Studs and Tracks - Pre-notched steel, 7/8 inch by 7/8 inch by 50 inches, 0.0329-inch minimum base steel thickness.
 - a. Product: Provide Clark-Dietrich Spazzer 9200 Bridging and Spacer Bar or equivalent product by other approved manufacturers.
- F. Hat-Shaped, Rigid Furring Channels: AISI S220.
 - 1. Minimum Base-Steel Thickness: 0.0296 inch.
 - 2. Depth: As indicated on Drawings.
- G. Resilient Furring Channels: 1/2-inch- deep, steel sheet members designed to reduce sound transmission.
 - 1. Configuration: Asymmetrical (single leg) or hat shaped (double leg).
 - a. Minimum Base Metal Thickness: 0.0296 inch.
 - 2. Embossed Resilient Furring Channels:
 - a. Minimum Base Metal Thickness: 0.0179 inch.
 - b. Product: Provide Clark-Dietrich RC-1 Pro Resilient Channel – Single Leg or equivalent product by other approved manufacturers.

- c. Product: Provide Clark-Dietrich RC-2 Pro Resilient Channel – Double Leg or equivalent product by other approved manufacturers.
- H. Cold-Rolled Furring Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges.
1. Depth: As indicated on Drawings.
 2. Furring Brackets: Adjustable, corrugated-edge-type steel sheet with minimum uncoated-steel thickness of 0.0329 inch.
 3. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.
- I. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches, wall attachment flange of 3/4 inch, minimum uncoated-steel thickness of 0.0179 inch, and depth required to fit insulation thickness indicated.
- J. Radius Framing: Steel sheet track for non-load-bearing curves, bends, variable radii and arches. Framing can be made from cut track or subject to compliance with requirements from the available products.
1. Minimum base-metal thickness: 0.0273 inch.
 2. Depth: As indicated on drawings.
- K. Pony Wall Support Framing: Partial wall framing connected to floor for cantilevered (low wall) partitions and partitions with unsupported top track. Can be installed in minimum 3-1/2 inch stud wall.
1. Stud Material: Structural Grade 50 Type H, 50 ksi, 97 mil (12 gage).
 2. Base Plate Material: ASTM A36 1/2 inch thick hot rolled steel with predrilled anchor holes.
 3. Product: Clark-Dietrich Pony Wall Heavy
 - a. No. PW24 – 23-3/4 inch tall with 3-3/8 inch wide x 8 inch long base plate.
 - b. No. PW36 – 35-3/4 inch tall with 3-3/8 inch wide x 8 inch long base plate.
 - c. No. PW48 – 47-3/4 inch tall with 3-3/8 inch wide x 8 inch long base plate.
 4. Installation:
 - a. 36” High Wall – PW24 at 4’-0” o.c. with 4 – 1/2” dia. x 3-1/2” Embed Hilti Kwik Bolt-3 expansion anchors in base.
 - b. 42” High Wall – PW36 at 4’-0” o.c. with 4 – 1/2” dia. x 3-1/2” Embed Hilti Kwik Bolt-3 expansion anchors in base.
 - c. 86” High Wall – PW48 at 2’-8” o.c. with 4 – 1/2” dia. x 3-1/2” Embed Hilti Kwik Bolt-3 expansion anchors in base.
- L. Extruded Aluminum Partition Closure for terminating partition wall to end of curtain wall mullion.
1. Product: MULLION MATE – Series 40 Plus, extruded aluminum partition closure by Gordon Interior Specialties Division, Gordon, Inc.
 2. System Description:
 - a. Extruded aluminum partition closures are pre-assembled, and spring loaded to provide a tight fit for vertical junctures of partitions and window walls.
 - b. Accessories: Brake formed mullion mate end cap.
 - c. Finish: Clear Anodized.

- d. Installation: Provide Batt Insulation and acoustical sealant at all material transitions as listed on manufacturer standard details.

2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.062-inch- diameter wire, or double strand of 0.048-inch- diameter wire.
- B. Hanger Attachments to Concrete:
 - 1. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC193 or AC308 as appropriate for the substrate.
 - a. Uses: Securing hangers to structure.
 - b. Type: Torque-controlled expansion anchor, torque-controlled adhesive anchor or adhesive anchor.
 - c. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5, unless otherwise indicated.
 - d. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).
 - 2. Power-Actuated Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- C. Wire Hangers: ASTM A641/A641M, Class 1 zinc coating, soft temper, 0.16 inch in diameter.
- D. Flat Hangers: Steel sheet, 1 by 3/16 inch by length indicated.
- E. Carrying Channels (Main Runners): Cold-rolled, commercial-steel sheet with a base-steel thickness of 0.0538 inch and minimum 1/2-inch- wide flanges.
 - 1. Depth: 2-1/2 inches unless indicated otherwise on Drawings.
- F. Furring Channels (Furring Members):
 - 1. Cold-Rolled Channels: 0.0538-inch uncoated-steel thickness, with minimum 1/2-inch- wide flanges, 3/4 inch deep.
 - 2. Steel Studs and Tracks: AISI S220 and ASTM C645, Section 10.
 - a. Minimum Base-Steel Thickness: 0.0296 inch.
 - b. Depth: As indicated on Drawings.
 - 3. Embossed, High-Strength Steel Studs and Tracks: AISI S220 and ASTM C645, Section 10.
 - a. Minimum Base-Steel Thickness: 0.0181 inch
 - b. Depth: As indicated on Drawings.
 - 4. Hat-Shaped, Rigid Furring Channels: AISI S220, 7/8 inch deep.
 - a. Minimum Base-Steel Thickness: 0.0296 inch.
 - 5. Resilient Furring Channels: 1/2-inch- deep members designed to reduce sound transmission.

- a. Configuration: Asymmetrical or hat shaped.
- G. Grid Suspension System for Gypsum Board Ceilings: ASTM C645, 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.; Drywall Grid Systems.
 - b. Chicago Metallic Corporation; 640/660 Drywall Ceiling Suspension System.
 - c. USG Corporation; Drywall Suspension System.

2.4 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.
- B. Sill Sealer Gasket at Exterior Walls: Closed-cell polyethylene foam, 3/16 to 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members as required.
 - 1. Product:
 - a. Dow Weathermate Sill Seal Foam Gasket.
 - b. Owens Corning FoamSealR Gasket.
 - c. Reflectix Inc. Pro Sill Sealer.

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 of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
 - 1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Install sill sealer gaskets at exterior walls to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C754, except comply with framing sizes and spacing indicated.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C840 that apply to framing installation.
- B. Install framing and accessories plumb, square, and true to line, with connections securely fastened.
- C. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- D. Install bracing at terminations in assemblies.
- E. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.
- F. Framing cannot be supported by the roof decking.
 - 1. Soffit framing and any other framing that does not bear on floor structure cannot be fastened to and supported by the overhead roof deck. Framing must be supported by the structural roof framing by using non-structural metal framing, cold-formed metal-framing or steel angle or channel shapes as required.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
 - 1. Single-Layer Application: 16 inches o.c., unless otherwise indicated.
 - 2. Multilayer Application: 16 inches o.c., unless otherwise indicated.
 - 3. Tile Backing Panels: 16 inches o.c., unless otherwise indicated.
- B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- C. Install studs so flanges within framing system point in same direction.
- D. Install tracks at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts that penetrate partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.

3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
6. Curved Partitions:
 - a. Cut top and bottom track/runners through leg and web at 2-inch intervals for arc length. In cutting lengths of runners, allow for uncut straight lengths of not less than 12 inches at ends of arcs.
 - b. Bend track to uniform curve and locate straight lengths so they are tangent to arcs.
 - c. Support outside (cut) leg of track/runners by clinching a 1-inch high by 0.0209-inch thick steel sheet strip to inside of cut legs using metal lock fasteners.
 - d. Begin and end each arc with a stud, and space intermediate studs equally along arcs. On straight lengths of no fewer than two studs at ends of arcs, place studs 6 inches o.c.

E. Direct Furring:

1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.

F. Z-Shaped Furring Members:

1. Erect insulation, specified in Section 072100 "Thermal Insulation," vertically and hold in place with Z-shaped furring members spaced 24 inches o.c.
2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch from the plane formed by faces of adjacent framing.

3.5 INSTALLING CEILING SUSPENSION SYSTEMS

- A. Install suspension system components according to sizes and spacings indicated on the Drawings, but not greater than spacings required by referenced installation standards for assembly types.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend 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 suspension system.

- a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
 - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
 3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 4. Flat Hangers: Secure to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices and fasteners that are secure and appropriate for structure and hanger, and in a manner that will not cause hangers to deteriorate or otherwise fail.
 5. Do not attach hangers to steel roof deck.
 6. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
 7. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
 8. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Seismic Bracing: Sway-brace suspension systems with hangers used for support.
- E. Grid Suspension Systems: Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
1. Install system per manufacturer's instructions.
 2. Install systems per UL rated assemblies indicated.
- F. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION

SECTION 092900

GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

- 1. Interior gypsum board.
- 2. Tile backing panels.
- 3. Sound attenuation blankets.

- B. Related Requirements include the following:

- 1. Section 061600 "Sheathing" for gypsum sheathing for exterior walls.
- 2. Section 092116.23 "Gypsum Board Shaft-Wall Assemblies" for metal shaft-wall framing, gypsum shaft liners, and other components of shaft-wall assemblies.
- 3. Section 092216 "Non-Structural Metal Framing" for non-structural steel framing and suspension systems that support gypsum board.
- 4. Section 093013 "Ceramic Tiling" for tile backing panels, from this section, installed as substrates for ceramic tile.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Samples: For the following products:
 - 1. Aluminum Trim: Full-size Sample in 12-inch- long length for each trim accessory indicated.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. Sound Control Partitions: For sound-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

- A. General: ASTM C 1396/C 1396M.
 - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Georgia-Pacific Building Products.
 - c. National Gypsum Company.
 - d. USG Corporation.
- B. Gypsum Wallboard:
 - 1. Regular Type: For vertical surfaces unless indicated otherwise.
 - a. Thickness: Refer to wall type schedule on drawings.
 - b. Long Edges: Tapered.
 - 2. Type X: Where indicated or required for fire resistance rated assemblies.

- a. Thickness: 5/8 inch.
 - b. Long Edges: Tapered.
3. Flexible Type: Manufactured to bend to fit radii and to be more flexible than standard regular-type gypsum board of same thickness.
- a. Thickness: 1/4 inch.
 - b. Long Edges: Tapered.
4. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.
- a. Thickness: 1/2 inch.
 - b. Long Edges: Tapered.
5. Mold-Resistant Type: With moisture- and mold-resistant core and paper surfaces.
- a. Core: 5/8-inch, Type X.
 - b. Long Edges: Tapered.
 - c. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 SPECIALTY GYPSUM BOARD

- A. Gypsum Board, Type C: ASTM C1396/C1396M. Manufactured to have increased fire-resistive capability.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Georgia-Pacific Building Products.
 - c. National Gypsum Company.
 - d. USG Corporation.
 2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
 3. Long Edges: Tapered.
- B. Glass-Mat Interior Gypsum Board: ASTM C1658/C1658M. With fiberglass mat laminated to both sides. Specifically designed for interior use.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. CertainTeed Corporation.
 - b. Georgia-Pacific Building Products.
 - c. National Gypsum Company.
 - d. USG Corporation.
 2. Core: 5/8 inch, Type X.
 3. Long Edges: Tapered.
 4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
 5. For use at interiors when gypsum board installations are required prior to building being enclosed and climate controlled.

- C. Acoustically Enhanced Gypsum Board: ASTM C1396/C1396M. Multilayer products constructed of two layers of gypsum boards sandwiching a viscoelastic sound-absorbing polymer core.
 - 1. Basis of Design: Subject to compliance with requirements, provide National Gypsum Company, Gold Bond Brand Soundbreak XP or one of the following products:
 - a. CertainTeed Gypsum; SilentFX QuickCut.
 - 2. Core: 5/8-inch, Type X.
 - 3. Long Edges: Tapered.
 - 4. See drawings for Sound Control Partitions that include acoustically enhanced gypsum board.
 - 5. See Auxiliary Materials in this section for sound-attenuation blankets, acoustical sealant and acoustical putty sheets that are to be used in Sound Control Partitions.

2.5 TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Board (Glass-Matt WR Backing Board): Complying with ASTM C 1178/C 1178M, with manufacturer's standard edges.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. CertainTeed Corporation "GlasRoc Diamondback Tile Backer".
 - b. Georgia-Pacific "DensShield Tile Backer".
 - c. National Gypsum Company "Gold Bond eXP Tile Backer.
 - d. USG Corporation "USG Durock Brand Glass-Mat Tile Backerboard."
 - 2. Core: 5/8-inch, Type X unless indicated otherwise.
 - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

- A. Interior Trim (Vinyl Trim): ASTM C 1047.
 - 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. Trim-Tex Drywall Products.
 - 2. Material: Rigid PVC.
 - a. Surface-Burning Characteristics: Comply with ASTM E84 for flame spread and smoke developed to achieve Class A rating.
 - 3. Shapes:
 - a. Cornerbead.
 - b. Expansion (control) joint, V Bead style; with tear-away bead.
 - c. L-Bead: L-shaped; with tear-away bead. Exposed long flange receives joint compound.
 - d. Curved-Edge Cornerbead: With notched or flexible flanges and tear-away bead.

2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 - 1. Interior Gypsum Board: Paper.
 - 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 - 1. Prefilling: At open joints, rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
 - 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
 - 3. Fill Coat: For second coat, use setting-type, sandable topping or drying-type, all-purpose compound.
 - 4. Finish Coat: For third coat, use setting-type, sandable topping or drying-type, all-purpose compound.
 - 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or drying-type, all-purpose compound.
 - a. High-build interior coating product designed for application by airless sprayer may be used instead of skim coat to produce Level 5 finish.
- D. Joint Compound for Tile Backing Panels:
 - 1. Glass-Mat, Water-Resistant Backing Panel: As recommended by backing panel manufacturer.

2.8 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 - 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
- D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
 - 1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
 - 2. Sound-Attenuation Blankets are to be installed at all Sound Control Partitions and any other designated locations.
- E. Acoustical Joint Sealant: As specified in Division 07 Section "Joint Sealants."

1. Acoustical sealant is to be used at all Sound Control Partitions and any other designated locations.
- F. Acoustical Putties: Nonhardening, non-corrosive, water-resistant, acoustical putties containing no solvents or inorganic fibers.
1. Acoustical putty sheets are to be used at all Sound Control Partitions and any other designated locations.
- G. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."
- H. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, including welded hollow-metal frames and support framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Install panels off of base floor substrate. Provide 1/8 inch to 1/4-inch-high maximum space at floor.
- E. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- F. Form control and expansion joints with space between edges of adjoining gypsum panels. Each board should be supported by separate framing members.
 1. Install control joints in accordance with the manufacturer's recommendations and where shown on the drawings, in addition to the following:
 - a. Locate joints at points of maximum stress and/or at points of natural weak planes, such as at openings, juncture of dissimilar materials, and at re-entrant corners.

- b. Locate joints in interior walls directly over building control and expansion joints.
 - c. Install control joints where partition abuts structural elements and dissimilar construction.
 - d. Locate joints in ceilings with a maximum of 50' between joints and a maximum of 2500 sq. ft. per undivided panel and where wings of "L", "U", and "T" shaped areas are joined.
 - e. Locate joints in interior partitions and walls without openings, with a maximum spacing of thirty feet (30') between joints.
- G. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
- 1. Fit gypsum panels around ducts, pipes, and conduits and install required sealant.
 - 2. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- wide joints to install sealant.
- H. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- I. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- 1. Space screws a maximum of 12 inches o.c. vertically, typical.
 - 2. Space screws at tile backing boards a maximum of 8" o.c. vertically.
- J. Sound Control Partitions: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.
- 1. Install acoustical putty sheet products at electrical device boxes, ductwork and any other penetration locations that require an acoustical seal.
 - a. At electrical device boxes, install on rear and all four sides of the box per manufacturer's instructions.
- K. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Single-Layer Application:

- 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
- 2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.

- b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.
 3. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
 4. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
 - B. Multilayer Application:
 1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints 1 framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
 2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
 3. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
 4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.
 - C. Laminating to Substrate: Where gypsum panels are indicated as directly adhered to a substrate (other than studs, joists, furring members, or base layer of gypsum board), comply with gypsum board manufacturer's written recommendations and temporarily brace or fasten gypsum panels until fastening adhesive has set.
 - D. Curved Surfaces:
 1. Install panels horizontally (perpendicular to supports) and unbroken, to extent possible, across curved surface plus 12-inch- long straight sections at ends of curves and tangent to them.
 2. For double-layer construction, fasten base layer to studs with screws 16 inches o.c. Center gypsum board face layer over joints in base layer, and fasten to studs with screws spaced 12 inches o.c.

3.4 APPLYING TILE BACKING PANELS

- A. Glass-Mat, Water-Resistant Backing Panel: Comply with manufacturer's written installation instructions and install where indicated. Install with 1/4-inch gap where panels abut other construction or penetrations.
- B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

3.5 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 at locations indicated on Drawings, according to ASTM C 840 and in specific locations approved by Architect for visual effect.

1. The following conditions or locations are a list of, but not inclusive of all, control joint locations:
 - a. Wall or partition that is an uninterrupted straight plane exceeding 50 feet when there is ceiling perimeter relief.
 - b. Wall or partition that is an uninterrupted straight plane exceeding 30 feet when there is no ceiling perimeter relief.
 - c. Where a wall or ceiling traverses a construction joint (expansion, seismic or building control element) in the base buildings structure.
 - d. Interior ceilings with perimeter relief at 50 feet intervals with areas between not exceeding 2,500 square feet.
 - e. Interior ceilings without perimeter relief at 30 feet intervals with areas between not exceeding 900 square feet.

C. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners.
2. L-Bead: Use where edge trim can only be installed after panels are installed.
3. Curved-Edge Cornerbead: Use at curved openings.

D. Aluminum Trim: Install in locations indicated on Drawings.

3.6 FINISHING GYPSUM BOARD

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.

1. Existing gypsum board surfaces where wall coverings have been removed are to be clean and free of remaining paste or adhesives and finished to Level 4.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: 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 2: Panels that are substrate for tile.
3. Level 3: Where indicated on Drawings.
4. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.

- a. Primer and its application to surfaces are specified in Division 09 "Interior Painting".

5. Level 5: Where indicated on Drawings.

- a. Primer and its application to surfaces are specified in Division 09 "Interior Painting".

E. For Level 1 gypsum board, embed tape in joint compound. Tape and fastener heads need not be covered with joint compound.

- F. For Level 2 gypsum board, embed tape in joint compound and cover tape, trim and fasteners with one coat of joint compound. Surface shall be free of excess joint compound. Tool marks and ridges are acceptable.
- G. For Level 4 gypsum board, perform level 2 work and then apply two separate coats of joint compound on all joints, trim and fastener. Sand between all coats and after last coat. Surface shall be smooth and free of all visual defects.
- H. For Level 5 gypsum board, perform level 4 work and then a thin skim coat of joint compound shall be trowel applied over the entire surface (leaving a skim coating of compound completely covering the paper surface).
 - 1. As an alternative to a skim coat, an approved special surface primer may be applied.
 - 2. Final surface must be smooth and free of all defects.
- I. Water-Resistant Gypsum Backing Board: Finish according to manufacturer's written instructions.
- J. Glass-Mat, Water-Resistant Backing Panels: Finish according to manufacturer's written instructions.
- K. Smoke Partitions: The intent of smoke partitions is for the wall to not have visible gaps. This includes terminations at the top and side, and at all penetrations.
 - 1. At walls designated as smoke partitions, tape all joints above the ceiling to a Level 2 to eliminate all gaps.
 - 2. Install tape/finishing compound or sealant at the perimeter of all penetrations.

3.7 PROTECTION

- A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.
- B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- C. Remove and replace panels that are wet, moisture damaged, or mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION

SECTION 093013

CERAMIC TILING

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. Porcelain tile.
2. Glazed wall tile.
3. Waterproof membrane for thinset applications.
4. Crack isolation membrane.
5. Metal edge strips.

- B. Related Requirements:

1. Section 079200 "Joint Sealants" for sealing of expansion, contraction, control, and isolation joints in tile surfaces.
2. Section 091001 "Floor Preparation" for hydraulic cement based self-leveling, trowelable and fill underlayments and substrate preparation and condition requirements.
3. Section 092900 "Gypsum Board" for tile backer board.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.

- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

- C. Module Size: Actual tile size plus joint width indicated.

- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1. Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

2. Review all scheduled systems and in particular, verify locations and extent of systems with the following:
 - a. Waterproof Membranes or Crack Isolation Membranes.
 - b. Surfaces that are sloped to drains.
 - c. Large Format Tiles and required setting materials.
 - d. Tile backer board types.
3. Review types and locations of sealant filled joints.

1.5 SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
- D. Samples for Initial Selection: For tile, grout, and accessories involving color selection.
- E. Samples for Verification:
 1. Full-size units of each type and composition of tile and for each color and finish required.
 2. Full-size units of each type of trim and accessory for each color and finish required.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 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.

1.8 FIELD 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 MANUFACTURERS

- A. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
 - 1. Obtain waterproof membrane and crack isolation membrane, except for sheet products, from manufacturer of setting and grouting materials.
- C. Source Limitations for Other Products: Obtain each of the following products specified in this Section from a single manufacturer:
 - 1. Metal edge strips.

2.2 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. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
- D. Mounting: For factory-mounted tile, provide back- or edge-mounted tile assemblies as standard with manufacturer unless otherwise indicated.
 - 1. Where tile is indicated for installation in wet areas, do not use back- or edge-mounted tile assemblies unless tile manufacturer specifies in writing that this type of mounting is suitable for installation indicated and has a record of successful in-service performance.

2.3 TILE PRODUCTS

- A. Ceramic Tile Type CT-1 and CT-2: Unglazed porcelain floor and wall tile.

1. Certification: Tile certified by the Porcelain Tile Certification Agency.
2. Face Size: As indicated by manufacturer's designations on the Drawings.
3. Face Size Variation: Rectified.
4. Thickness: As indicated by manufacturer's designations on the Drawings.
5. Face: Plain with square or cushion edges.
6. Dynamic Coefficient of Friction: Not less than 0.42.
7. Tile Color, Glaze and Pattern: As indicated by manufacturer's designations on the Drawings.
8. Grout Color: As indicated by manufacturer's designations on the Drawings.
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. External Corners: Metal edge strips.
 - b. Internal Corners: Field-buttet square corners.

B. Ceramic Tile Type CT-3: Glazed decorative wall tile.

1. Module Size: 3 by 6 inches
2. Face Size Variation: Rectified.
3. Thickness: Minimum of 5/16 inch.
4. Face: Plain with modified square edges or cushion edges.
5. Tile Color, Finish and Pattern: As indicated by manufacturer's designations on the Drawings.
6. Grout Color: As indicated by manufacturer's designations on the Drawings.
7. Glazed decorative wall tile to align with stainless steel wall base SSB-1. Refer to Drawings.

2.4 WATERPROOF MEMBRANE

- A. General: Manufacturer's standard product, selected from the following that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Waterproof Membrane, Fabric-Reinforced, Fluid-Applied: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.
 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bostik, Inc.; Black-Top.
 - b. Custom Building Products; Custom 9240 Waterproofing & Anti-Fracture Membrane.
 - c. Laticrete International, Inc.; Laticrete 9235 Waterproofing Membrane.
 - d. MAPEI Corporation; Mapelastic AquaDefense with MAPEI Fiberglass Mesh or Mapeband cove roll.
 - e. TEC, H. B. Fuller Construction Products, Inc., HydraFlex Waterproofing Crack Isolation and Membrane 316.

2.5 CRACK ISOLATION MEMBRANE

- A. General: Manufacturer's standard product, selected from the following that complies with ANSI A118.12 for standard performance [high performance] and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
- B. Crack Isolation Membrane, Fabric-Reinforced, Fluid-Applied: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bostik, Inc.; Bostik Blacktop.
 - b. Custom Building Products; Fracture Free Crack Prevention Membrane.
 - c. Laticrete International, Inc.; Blue 92 Anti-Fracture Membrane.
 - d. MAPEI Corporation; Mapelastic CI with MAPEI Fiberglass Mesh or Mapeband cover roll.
 - e. TEC, H. B. Fuller Construction Products, Inc., HydraFlex Waterproofing Crack Isolation and Membrane 316.

2.6 SETTING MATERIALS

A. Modified Dry-Set Mortar (Thinset): ANSI A118.4.

1. Product: Subject to compliance with requirements, provide one of the following:
 - a. Bostik, Inc., Reflex.
 - b. Custom Building Products, Flexbond Premium Crack Prevention Thin-Set Mortar.
 - c. Laticrete, 254 Platinum Thinset Mortar.
 - d. MAPEI Corporation, UltraFlex 3 or Keraflex Super.
 - e. TEC, H. B. Fuller Construction Products, Inc., Super Flex Ultra-Premium Thin Set Mortar.
2. Provide either of the following:
 - a. Prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site
 - b. Prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site
3. For wall applications, provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4.

B. Large and Heavy Tile, Modified Dry-Set Mortar (Medium-Bed): Comply with requirements in ANSI A118.4. Provide product that is approved by manufacturer for application thickness of up to 5/8 inch.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bostik, Inc., Big Tile & Stone
 - b. Custom Building Products, VersaBond LFT Professional Large Format Tile Mortar.
 - c. Laticrete International Inc., 4 XLT.
 - d. MAPEI Corporation, Kerabond T/Keralastic or Keraflex Super.
 - e. TEC, H. B. Fuller Construction Products, Inc., Ultimate 6 Plus Mortar.
2. Provide either of the following:
 - a. Prepackaged, dry-mortar mix containing dry, redispersible, vinyl acetate or acrylic additive to which only water must be added at Project site
 - b. Prepackaged, dry-mortar mix combined with acrylic resin or styrene-butadiene-rubber liquid-latex additive at Project site

2.7 GROUT MATERIALS

A. Standard Cement Grout: ANSI A118.6.

1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Bostik, Inc., Hydromet Dry Tile Grout (unsanded) and Hydromet Ceramic Tile Grout (sanded).
 - b. Custom Building Products, Polyblend Plus Sanded and Unsanded Grout.
 - c. Laticrete International, Inc., Laticrete 1600 Unsanded and Laticrete 1500 sanded
 - d. MAPEI Corporation, Keracolor U (unsanded) and Keracolor S (sanded).
 - e. TEC, H. B. Fuller Construction Products, Inc., AccuColor Premium Unsanded Grout 620 and Sanded Grout 650.
2. Polymer Type: Ethylene vinyl acetate or acrylic additive, in dry, redispersible form, prepackaged with other dry ingredients.
 - a. Unsanded grout mixture for joints 1/8-inch and narrower.
 - b. Sanded grout mixture for joints 1/8-inch and wider.
 - c. Use grout admixture in place of water.

B. Premixed Polymer Resin Grout: One-part ready to use grout.

1. Product: Subject to compliance with requirements, provide one of the following:
 - a. Bostik, Inc.; TruColor RapidCure
 - b. Custom Building Products; Fusion Pro Single Component Grout.
 - c. Laticrete International, Inc., SPECTRALOCK 1 Premixed Grout.
 - d. MAPEI Corporation; Flexcolor CQ.
 - e. TEC, H. B. Fuller Construction Products, Inc., InColor Advanced Performance Grout.
2. Polymer Type: Water based acrylic-silicone resin or urethanes.
3. Product to meet ANSI A118.3 specifications and have passed ANSI 118.3 testing.

2.8 MISCELLANEOUS MATERIAL

A. Self-Leveling and Trowelable Underlayments, and Patching Compounds: See Section 091001 "Floor Preparation" for hydraulic cement based self-leveling, trowelable and fill underlayments, and substrate preparation and condition requirements.

B. Metal Edge Strips: Angle or L-shaped, height to match tile and setting-bed thickness, metallic designed specifically for flooring applications; stainless-steel, ASTM A666, brushed, 300 Series exposed-edge material unless noted otherwise.

1. Basis-of-Design Products: Subject to compliance with requirements, provide products by Schluter Systems L.P. or comparable product by one of the following:
 - a. Blanke Corporation.
 - b. Ceramic Tool Company, Inc.
2. Products: Subject to compliance with requirements, provide products by Schluter Systems L.P.
 - a. New tile to lower height finish material: RENO-U No. EBU 100.
 - b. New tile to concrete: RENO-RAMP No AERP 100 B65, satin anodized aluminum.

3. Metal Stair Nosings: Stair nosing profile with height to match tile and setting – bed thickness, stainless steel brushed 304.
 - a. Stair nosing for tile riser meeting tile tread: No. TREP – FL 110 EB.
4. Metal Wall Edge Protection: Corner profile with extended leg designed to match tile and setting bed thickness. Stainless steel brushed 304.
 - a. Outside corner trim: FINEC F 90 E.
- C. Temporary Protective Coating: Either product indicated below that is formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
 1. Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F per ASTM D 87.
 2. Grout release in form of manufacturer's standard proprietary liquid coating that is specially formulated and recommended for use as temporary protective coating for tile.
- D. 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.
- E. Tile 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, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Bostik, Inc.; CeramaSeal Grout & Tile Sealer.
 - b. Custom Building Products, Aqua Mix Sealer's Choice Gold.
 - c. Laticrete International, Inc, Stonetech Quartz and Porcelain Tile Sealer.
 - d. MAPEI Corporation; KER 004, Keraseal Penetrating Sealer for Unglazed Grout and Tile.

2.9 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 the Work.

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 thinset 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 thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
- B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.
- C. 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.
- D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 CERAMIC TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA 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 TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 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. Tile floors consisting of tiles 8 by 8 inches or larger.
- 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. Where accent tile differs in thickness from field tile, vary setting-bed thickness so that tiles are flush.
- F. 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. For tile mounted in sheets, make joints between tile sheets same width as joints within tile sheets so joints between sheets are not apparent in finished work.
 - 2. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 3. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
 - 1. Ceramic Mosaic Tile: 1/16 inch.
 - 2. Glazed Wall Tile: 1/8 inch.
 - 3. Porcelain Tile: 1/8 inch.
- H. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.
- I. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, indicated below. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.
 - 1. Slab on Grade Concrete; all movement joints (sawcuts and others) must be continued up through the tile installation. Sealant-filled joints with backer rod are to be installed.
 - a. Sealant-filled joints are to be placed at a maximum of 25' in each direction at interior slab on grade tile installations if there are not any sawcuts or other movement joints.
 - 2. Suspended Concrete Slabs (concrete on metal deck); There must be sealant-filled joints with backer rod spaced no more than 12 feet apart both directions.
 - a. Where joints occur in suspended concrete slab substrates, locate joints in tile surfaces directly above them.
 - 3. Sealant-filled perimeter joints are to be installed where tile installation abuts restraining surfaces such as perimeter walls, dissimilar floor finishes, columns, pipes and where changes occur in substrate materials.
 - 4. Sealant-filled joints are to be placed at changes in plane, interior movement joints at all inside corners.
 - 5. Joint Width - Interiors:
 - a. Perimeter joints at walls, not less than ¼". Can be covered by tile trim, cove base or shoe molding.
 - b. Perimeter joints other than walls 1/8" to 1/4".
 - c. Change of plane, same as grout joint but not less than 1/8".

- J. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.
- K. Floor Sealer: Apply floor sealer to cementitious grout joints in tile floors according to floor-sealer manufacturer's written instructions. As soon as floor sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION

- A. Install panels and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.
 - 1. See Section 092900 "Gypsum Board".

3.5 WATERPROOFING INSTALLATION

- A. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness that is bonded securely to substrate.
- B. Allow waterproofing to cure and verify by testing that it is watertight before installing tile or setting materials over it.

3.6 CRACK ISOLATION MEMBRANE INSTALLATION

- A. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness that is bonded securely to substrate.
- B. Allow crack isolation membrane to cure before installing tile or setting materials over it.

3.7 ADJUSTING AND CLEANING

- A. Remove and replace tile that is damaged or that does not match adjoining tile. Provide new matching units, installed as specified and in a manner to eliminate evidence of replacement.
- B. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove 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.

3.8 PROTECTION

- A. 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.
- B. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.

- C. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.9 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

1. Ceramic Tile Installation: TCNA F113; thinset mortar.
 - a. Ceramic Tile Type: CT-1.
 - b. Thinset Mortar: Large and Heavy Tile (Medium-bed), modified dry-set mortar.
 - c. Grout: Standard sanded cement grout.
2. Ceramic Tile Installation: TCNA F122A; thinset mortar on waterproof membrane.
 - a. Ceramic Tile Type: CT-1.
 - b. Thinset Mortar: Large and Heavy Tile (Medium-bed), modified dry-set mortar.
 - c. Grout: Standard sanded cement grout.
3. Ceramic Tile Installation: TCNA F125-Full thinset mortar on crack isolation membrane.
 - a. Ceramic Tile Type: CT-1.
 - b. Thinset Mortar: Large and Heavy Tile (Medium-bed), modified dry-set mortar.
 - c. Grout: Standard sanded cement grout.

B. Interior Wall Installations, Wood or Metal Studs or Furring:

1. Ceramic Tile Installation: TCNA W243; thinset mortar on gypsum board (Water Resistant Gypsum Backing Board).
 - a. Ceramic Tile Type: CT-2 and CT-3.
 - b. Thinset Mortar:
 - 1) CT-2: Large and Heavy Tile (Medium-bed), mortar.
 - 2) CT-3: Modified dry-set mortar.
 - c. Grout: Standard unsanded cement grout.

END OF SECTION

SECTION 095113

ACOUSTICAL PANEL 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 acoustical panels and exposed suspension systems for interior ceilings.
- B. Related Requirements:
 - 1. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" or adjacent soffits and bulkheads.
 - 2. Section 095133 "Acoustical Metal Pan Ceilings."
- C. 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 SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Acoustical Panels: Set of 6-inch- square samples of each type, color, pattern, and texture.
 - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch long Samples of each type, finish, and color.
- D. Maintenance Data: For finishes to include in maintenance manuals.

1.5 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 panels equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, 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 panels, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical panel ceiling installation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of acoustical ceiling panel and its supporting suspension system from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Seismic Performance: Suspended ceilings shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- B. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 1. Flame-Spread Index: Class A according to ASTM E1264.
 2. Smoke-Developed Index: 50 or less.
- C. Fire-Resistance Ratings: Comply with ASTM E119; 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 PANELS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products by Armstrong World Industries, Inc. or a comparable product by one of the following:
1. CertainTeed Corporation.
 2. United States Gypsum Company.
- B. Acoustical Panel Standard: Provide manufacturer's standard panels according to ASTM E1264 and designated by type, form, pattern, acoustical rating, and light reflectance unless otherwise indicated.
- C. Acoustical Panel Type APC-1 (Classroom and Educational Spaces).
1. Product:
 - a. Armstrong World Industries Fine Fissured High NRC No. 1757.
 - b. CertainTeed Corporation: HHF-494-HNRCX
 - c. United States Gypsum Company: Radar Acoustical Panels No. 22345
 2. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - a. Type and Form: Type III, mineral base with painted finish; Form 1.
 - b. Pattern: CE (perforated, small holes and lightly textured).
 3. Color: White.
 4. LR: Not less than 0.85
 5. NRC: Not less than 0.75.
 6. CAC: Not less than 35.
 7. Edge/Joint Detail: Angled tegular sized to fit flange of exposed suspension system members.
 8. Thickness: 7/8 inch.
 9. Modular Size: 24 by 48 inches.
 10. Antimicrobial Treatment: Manufacturer's standard which resists the growth of mold, mildew and bacteria.
 11. Recycled Content: Pre-Consumer not less than 60 percent.
 12. Suspension System: Type MSS-1.
- D. Acoustical Panel Type APC-2.
1. Product:
 - a. Armstrong Ultima High NRC No. 1942.
 - b. CertainTeed Corporation: Symphony M High NRC – 1222BB-80-1
 - c. United States Gypsum Company: Mars High NRC No. 87100
 2. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - a. Type and Form: Type IV, mineral base with membrane-faced overlay; Form 2, with manufacturer's acoustically transparent membrane and factory applied latex paint.
 - b. Pattern: E (lightly textured).
 3. Color: White.
 4. LR: Not less than 0.85.
 5. NRC: Not less than 0.80.

6. CAC: Not less than 35.
 7. Edge/Joint Detail: Beveled Tegalur sized to fit flange of exposed suspension system members.
 8. Thickness: 7/8 inch.
 9. Modular Size: 24 by 24 inches.
 10. Antimicrobial Treatment: Manufacturer's standard which resists the growth of mold, mildew and bacteria.
 11. Recycled Content:
 - a. Pre-Consumer not less than 70 percent.
 - b. Post-Consumer not less than 10 percent.
 12. Suspension System: Type MSS-2.
- E. Acoustical Panel Type APC-3a.
1. Product:
 - a. Armstrong School Zone Fine Fissured ~~1811~~ **1714**.
 - b. CertainTeed Corporation: ~~Sereno~~ Fine Fissured **High NRC SFF-497 HNRC/HCACX HHF-497 HNRCX**.
 - c. United States Gypsum Company: Radar High NRC/~~CAC~~ No. ~~22541~~ **22441**.
 2. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - a. Type and Form: Type III, mineral base with membrane-faced overlay; Form 2.
 - b. Pattern: CE (perforated, small holes and lightly textured).
 3. Color: White.
 4. LR: Not less than 0.80.
 5. NRC: Not less than 0.70.
 6. CAC: Not less than ~~40~~ **35**.
 7. Edge/Joint Detail: Square.
 8. Thickness: 3/4 inch units.
 9. Modular Size: 24 by 48 inches.
 10. Antimicrobial Treatment: Manufacturer's standard which resists the growth of mold, mildew and bacteria.
 11. Recycled Content: Pre-Consumer not less than 50 percent.
 12. Suspension System: Type MSS-1.
- F. Acoustical Panel Type APC-3b.
1. Product:
 - a. Armstrong School Zone Fine Fissured ~~1810~~ **1713**.
 - b. CertainTeed Corporation: ~~Sereno~~ Fine Fissured **High NRC SFF-457 HNRC/HCACX HHF-457 HNRCX**.
 - c. United States Gypsum Company: Radar High NRC/~~CAC~~ No. ~~22521~~ **22421**.
 2. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
 - a. Type and Form: Type III, mineral base with membrane-faced overlay; Form 2.
 - b. Pattern: CE (perforated, small holes and lightly textured).

3. Color: White.
4. LR: Not less than 0.80.
5. NRC: Not less than 0.70.
6. CAC: Not less than ~~40~~ 35
7. Edge/Joint Detail: Square.
8. Thickness: 3/4 inch units.
9. Modular Size: 24 by 24 inches.
10. Antimicrobial Treatment: Manufacturer's standard which resists the growth of mold, mildew and bacteria.
11. Recycled Content: Pre-Consumer not less than 50 percent.
12. Suspension System: Type MSS-1.

2.4 METAL SUSPENSION SYSTEM

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products by Armstrong World Industries, Inc. or a comparable product by one of the following:
 1. Chicago Metallic by Rockfon.
 2. United States Gypsum Company.
- B. Metal Suspension-System Standard: Provide manufacturer's standard, direct-hung, metal suspension system and accessories according to ASTM C635/C635M and designated by type, structural classification, and finish indicated.
 1. High-Humidity Finish: Where indicated, provide coating tested and classified for "severe environment performance" according to ASTM C635/C635M.
- C. Metal Suspension System, Type MSS-1.
 1. Product: Armstrong Prelude XL 15/16 inch.
 2. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation, with prefinished 15/16-inch- wide metal caps on flanges.
 - a. Structural Classification: Intermediate or Heavy-duty system.
 - b. End Condition of Cross Runners: Butt-edge type.
 - c. Face Design: Flat, flush.
 - d. Cap Material: Steel cold-rolled sheet.
 - e. Cap Finish: Painted white.
- D. Metal Suspension System Type MSS-2.
 1. Product: Armstrong Suprafine XL 9/16 inch.
 2. Narrow-Face, Steel-Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 coating designation, with prefinished, cold-rolled, 9/16-inch- wide metal caps on flanges.
 - a. Structural Classification: Intermediate or Heavy-duty system.
 - b. End Condition of Cross Runners: Butt-edge type.
 - c. Face Design: Flat, flush.
 - d. Cap Material: Steel.
 - e. Cap Finish: Painted white.

2.5 ACCESSORIES

- A. Attachment Devices: Size for five times the design load indicated in ASTM C635/C635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.
 - 1. 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 times that imposed by ceiling construction, as determined by testing according to ASTM E1190, 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 A641/A641M, Class 1 zinc coating, soft temper.
 - 2. Size: Wire diameter sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than 0.106-inch- diameter wire.
- C. Hold-Down Clips: Manufacturer's standard hold-down.
- D. Impact Clips: Manufacturer's standard impact-clip system designed to absorb impact forces against acoustical panels.

2.6 METAL EDGE MOLDINGS AND TRIM

- A. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. Edge moldings shall fit acoustical panel edge details and suspension systems indicated and match width and configuration of exposed runners unless otherwise indicated.
 - 2. For lay-in panels with reveal edge details, provide stepped edge molding that forms reveal of same depth and width as that formed between edge of panel and flange at exposed suspension member.
 - a. Drywall/Acoustical ceiling tile reveal: Subject to compliance with requirements, provide Fry Reglet; Drywall Acoustical Reveal or a comparable product by one of the following:
 - 1) Gordon, Inc.; C Series Custom Trims
 - 2) Pittcon Industries
 - 3. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.
- B. 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. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries, Inc.; Axiom Perimeter Trim or a comparable product by one of the following:
 - a. USG Interiors, Inc.; Compasso Trim.
 - b. Chicago Metallic Corporation; Infinity Perimeter Trim.
 - c. Gordon, Inc.; Contura Standard.
2. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2.7 ACOUSTICAL SEALANT

- A. Acoustical Sealant: As specified in Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders unless otherwise indicated, and comply with layout shown on reflected ceiling plans.
- B. Layout openings for penetrations centered on the penetrating items.

3.3 INSTALLATION

- A. Install acoustical panel ceilings according to ASTM C636/C636M 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 and, if permitted with fire-resistance-rated ceilings, 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 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. Provide supplemental framing as required if structural members are spaced too far apart.
 10. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches 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 panels.
1. Apply acoustical sealant in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.
 - a. Acoustical Panel Type APC-1.
 - b. See drawings for locations.
 2. Screw attach moldings to substrate at intervals not more than 16 inches o.c. and not more than 3 inches 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. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide precise fit.
1. Arrange directionally patterned acoustical panels as follows:
 - a. As indicated on reflected ceiling plans.

2. For square-edged panels, install panels with edges fully hidden from view by flanges of suspension-system runners and moldings.
3. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
4. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.
5. Install hold-down and impact clips in areas indicated; space according to panel manufacturer's written instructions unless otherwise indicated.
 - a. Hold-Down Clips: Space 24 inches o.c. on all cross runners.
 - b. Provide at open Corridor Lobby 101 and open Corridor 200.
6. Protect lighting fixtures and air ducts according to requirements indicated for fire-resistance-rated assembly.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet 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, non-cumulative.

3.5 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION

SECTION 095133

ACOUSTICAL METAL PAN CEILINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Acoustical metal pans and associated suspension system for interior ceilings.

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.

C. Products furnished, but not installed, under this Section include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.2 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.3 SUBMITTALS

A. Product Data: For each type of product. Include procedure for cutting metal pans.

B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

C. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below:

1. Metal Pans: Set of 6-inch- square Samples of each type, finish, color, pattern, and texture. Show pan edge profile.
2. Sound Absorber: Sample of each type matching size of Sample metal pan.

D. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Suspended ceiling components.
2. Structural members to which suspension systems will be attached.
3. Size and location of access modules for acoustical panels.
4. Items penetrating finished ceiling including the following:
 - a. Lighting fixtures.
 - b. Air outlets and inlets.
 - c. Speakers.
 - d. Sprinklers.

- e. Access panels.
 - 5. Perimeter moldings.
 - E. Qualification Data: For testing agency.
 - F. Product Test Reports: For each acoustical metal pan ceiling, for tests performed by a qualified testing agency.
 - G. Evaluation Reports: For each acoustical metal pan ceiling suspension system and anchor and fastener type.
 - H. Field quality-control reports.
- 1.4 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For finishes to include in maintenance manuals.
- 1.5 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 Metal Pans with Sound Absorber: Full-size units equal to 2 percent of quantity installed.
- 1.6 QUALITY ASSURANCE
- A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.
 - B. 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 indicated on Drawings.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Deliver acoustical metal pans, suspension-system components, and accessories 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 acoustical metal pans, suspension-system components, and accessories carefully to avoid damaging units and finishes in any way.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: Comply with ASTM E1264 for Class A materials.
 - 2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL METAL PANS, GENERAL

- A. Source Limitations: Obtain each type of acoustical metal ceiling pan and supporting suspension system from single source from single manufacturer.
- B. Acoustical Panel Standard: Provide manufacturer's standard pans of configuration indicated that comply with ASTM E1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
 - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches away from test surface according to ASTM E795.
- C. Sheet Metal Characteristics: For metal components exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, roughness, stains, or discolorations.
 - 1. Aluminum Sheet: Rolled aluminum sheet, complying with ASTM B209; alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- D. Sound-Absorbent Pads: Provide width and length to completely fill concealed surface of pan, with surface-burning characteristics for flame-spread index of 25 or less and smoke-developed index of 50 or less, as determined by testing according to ASTM E84, and to comply with the following requirements:
 - 1. Unwrapped, Glass-Fiber Insulation: Black coated, unfaced, complying with ASTM C553, Type I, Type II, or Type III; treated to be nondusting; minimum 1 inch thick.
- E. Adhesive: Manufacturer's standard nonflammable adhesive for sound-absorbent pads.

2.3 ALUMINUM PANS FOR ACOUSTICAL METAL PAN CEILING (Acoustical Metal Panels AMP-1}

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Metalworks Torsion Spring Acoustical Panels No. 7210-M18-MYA by Armstrong World Industries, Inc. or one of the following:
 - 1. CertainTeed Corporation; Torsion Spring Metal ceilings.
 - 2. United States Gypsum Company; Celebration Snap-In Metal Panels.
- B. Classification: Units complying with ASTM E1264 for Type VII, perforated aluminum facing (pan) with mineral- or glass-fiber-base backing.

1. Pattern A: (Perforated, regularly spaced large holes), arranged in diagonal alignment to pan edge with uniform perforations of dimension, holes per square foot or inch, and percent open area as indicated by product designation.
- C. Pan Fabrication: Manufacturer's standard units of size, profile, and edge treatment indicated, formed from metal indicated and finished to comply with requirements indicated.
 1. Torsion-Spring-Hinged Pans: Designed to be securely retained in preslotted, exposed suspension grid by torsion springs provided by manufacturer.
- D. Pan Thickness: Not less than 0.040 inch.
- E. Pan Edge Detail: Square.
- F. Pan Joint Detail: Wide reveal, not less than 15/16 inch wide.
- G. Pan Size: 24 by 96 inches.
- H. Pan Perforations: M18, Round Diagonal - Rd 3210.
- I. Pan Face Finish: Smooth finish, painted to match color indicated by product designation.
 1. Color: Lacquer Mill (LMA).
- J. NRC: Not less than 0.90 with sound absorbent pads.
 1. Sound Absorbent Pads: Armstrong No. 5823 BioAcoustic Infill Panel.
 - a. Black Matte.
 - b. Minimum 1 inch thick.

2.4 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C635/C635M requirements.
- B. Suspension Systems: Provide systems complete with carriers, runners, splice sections, connector clips, alignment clips, leveling clips, hangers, molding, trim, retention clips, load-resisting struts, and other suspension components required to support ceiling units and other ceiling-supported construction.
- C. Attachment Devices: Size for 5 times the design load indicated in ASTM C635/C635M, Table 1, Direct Hung, unless otherwise indicated. Comply with seismic design requirements.
- D. 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 E488/E488M conducted by a qualified testing agency.
- E. Power-Actuated Anchors: 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 allowable load capacities calculated according to ICC-ES AC70, greater than or

equal to the design load, as determined by testing per ASTM E1190 conducted by a qualified testing agency.

- F. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
1. Zinc-Coated, Carbon-Steel Wire: ASTM A641/A641M, Class 1 zinc coating, soft temper.
 2. Stainless Steel Wire: ASTM A580/A580M, Type 304, nonmagnetic.
 3. Size: Select wire diameter so its stress at 3 times the hanger design load indicated in ASTM C635/C635M, Table 1, Direct Hung, is less than yield stress of wire, but provide not less than 0.135-inch- diameter wire.
- G. Exposed Metal Edge Moldings and Trim: Provide exposed members as indicated or as required to comply with seismic requirements of authorities having jurisdiction, to conceal edges of and penetrations through ceiling, to conceal edges of pans and runners, for fixture trim and adapters, for fasciae at changes in ceiling height, and for other conditions; of metal and finish matching acoustical metal pan ceiling units unless otherwise indicated.
1. For Circular Penetrations of Ceiling: Fabricate edge moldings to diameter required to fit penetration exactly.

2.5 METAL SUSPENSION SYSTEM FOR ACOUSTICAL, STANDARD-GRID METAL PAN CEILING

- A. Manufacturer: Subject to compliance with requirements, provide products by Armstrong World Industries, Inc. or a comparable product by one of the following:
1. CertainTeed Corporation.
 2. United States Gypsum Company.
- B. Suspension System: For torsion-spring-hinged pans.
1. Product: Armstrong Prelude XL 15/16 inch.
 2. Wide-Face, Capped, Double-Web, Suspension System: Main and cross runners roll formed from cold-rolled steel sheet, prepainted, electrolytic zinc-coated or hot-dip galvanized according to ASTM A653/A653M, G30 (Z90) coating designation, with prefinished, cold-rolled, 15/16-inch- wide, sheet metal caps on flanges.
 - a. Structural Classification: Intermediate-duty system.
 - b. End Condition of Cross Runners: Butt-edge type.
 - c. Face Design: Flat, flush.
 - d. Cap Material: Steel or aluminum cold-rolled sheet.
 - e. Cap Finish: Painted to match color of metal pan.
 3. Suspension System for Torsion-Spring-Hinged Metal Pans: Provide runners with factory-cut slots fabricated to accept torsion-spring-hinged attachment.

2.6 ACOUSTICAL SEALANT

- A. Acoustical Sealant for Exposed and Concealed Joints:
1. Acoustical Sealant: As specified in Section 079200 "Joint Sealants."

2.7 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.

2.8 ALUMINUM FINISHES

- A. Lacquered Mill Finish: AA-M10C10R1x (Mechanical Finish: as fabricated, unspecified; Chemical Finish: chemically cleaned; Organic Coating: as specified below).
 - 1. Organic Coating: Manufacturer's standard clear organic coating.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical metal pan ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical metal pan ceilings.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical metal pans to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width pans at borders, and comply with layout shown on reflected ceiling plans and coordination drawings.

3.3 INSTALLATION

- A. General: Install acoustical metal pan ceiling assemblies to comply with ASTM C636/C636M, and manufacturer's written instructions.
- 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 or carrying channels and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that do not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. 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.
 6. 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.
 7. Do not attach hangers to steel deck tabs.
 8. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 9. Space hangers not more than 48 inches o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches from ends of each member.
 10. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members or carrying channels 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 metal pans.
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 o.c. and not more than 3 inches from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet 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. Cut acoustical metal pan units for accurate fit at borders and at interruptions and penetrations by other work through ceilings. Stiffen edges of cut units as required to eliminate evidence of buckling or variations in flatness exceeding referenced standards for stretcher-leveled metal sheet. Cut and treat edges to comply with manufacturer's written instructions.
- G. Install acoustical metal pans in coordination with suspension system and exposed moldings and trim. Comply with manufacturer's installation tolerances.
1. For lay-in, square-edge pans, install pans with edges fully hidden from view by flanges of suspension-system runners and moldings.
 2. For lay-in, reveal-edge pans on suspension-system runners, install pans with bottom of reveal in firm contact with top surface of runner flanges.
 3. For lay-in, reveal-edge pans on suspension-system members with box-shaped flanges, install pans with reveal surfaces in firm contact with suspension-system surfaces and panel faces flush with bottom face of runners.
 4. For torsion-spring-hinged pans, position pans according to manufacturer's written instructions.
 5. For snap-in pans, fit adjoining units to form flush, tight joints.

6. Align joints in adjacent courses to form uniform, straight joints parallel to room axis in both directions unless otherwise indicated.
 7. Fit adjoining units to form flush, tight joints.
 8. Install directionally patterned or textured metal pans in directions indicated.
 9. Install sound-absorbent fabric layers in, and bond to, perforated metal pans.
 10. Install sound-absorbent pads in perforated metal pans.
- H. Install sound attenuation panels in areas indicated by reflected ceiling plans or room finish schedules. Lay panels directly on ceiling system and close major openings to form complete coverage in required areas. Lay second sound-absorbent pads on sound attenuation panels.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical metal pan ceilings, 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 ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

END OF SECTION

SECTION 095434

ACOUSTICAL BAFFLE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. 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. Acoustical baffles with suspension system.
- B. Related Sections:
 - 1. Division 09 Section, "Non-Structural Metal Framing" for suspension of acoustical panels.

1.3 DEFINITIONS

- A. LR: Light Reflectance Coefficient.
- B. NRC: Noise Reduction Coefficient.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Maintenance Data: For finishes to include in Maintenance Manuals.
- C. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- D. Shop Drawings:
 - 1. Include plans, elevations, sections, details and installation system details.
 - 2. Include details at ceiling attachment.
- E. Samples for Verification:
 - 1. Acoustical Baffle and Panel: 12-inch square
 - 2. Acoustical Baffle and Panel attachments and accessories – one set.

1.5 QUALITY ASSURANCE

- A. Single-Source Responsibility: Provide baffles and method of attachment and suspension system by a single manufacturer.
- B. 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.
- C. Fire-Test-Response Characteristics: Provide acoustical panel ceilings that comply with the following requirements:
 - 1. Fire-Resistance Characteristics: Where indicated, provide acoustical panel ceilings identical to those of assemblies tested for fire resistance per ASTM E 119 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 2. Revise first subparagraph below if only assemblies tested by one or more specifically named testing and inspecting agencies are acceptable. Indicate rating, testing agency, and testing agency's design designation on Drawings.
 - 3. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.
 - 4. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 5. Surface-Burning Characteristics: Provide acoustical panels with the following surface-burning characteristics complying with ASTM E 1264 for Class A materials as determined by testing identical products per ASTM E 84
- D. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store the metal suspension system, baffles in an interior location and keep in cartons prior to installation to avoid damage.
- B. Exercise care in moving and opening cartons to prevent damage to the acoustical baffles.
- C. Handle acoustical baffles carefully to avoid damaging units in any way.

1.7 PROJECT CONDITIONS

- A. Space Enclosure:
 - 1. Building areas to receive baffles shall be free of construction dust and debris.
 - 2. Products can be installed at 80 degrees F (27 degrees C) with humidity not below 35% RH and not exceeding 55% RH.
 - 3. Do not install where standing water is present or where moisture will come in direct contact with the canopy.
 - 4. Following installation, conditions must be maintained below 70% RH. All wet work must be complete and dry prior to installation.
 - 5. Avoid direct exposure acoustical baffles to sunlight.
 - 6. Installation shall be carried out where the temperature is between 60 degrees F and 80 degrees F.
 - 7. These temperature conditions must be maintained throughout the life of the product or warranty will be void.

1.8 COORDINATION

- A. Coordinate layout and installation of acoustical baffles and suspension system with other construction that penetrates ceilings, including light fixtures, HVAC, and fire suppression system.

1.9 WARRANTY

- A. Acoustical Baffles: Submit a written warranty executed by the manufacturer, agreeing to repair or replace baffles that fail within the warranty period. Failures include, but are not limited to:
 - 1. Baffles: Manufacturing defects.
 - 2. Attachment devices: Rusting and manufacturing defects.
- B. Warranty Period:
 - 1. Baffles: One (1) year from date of substantial completion.
 - 2. Attachment devices: One (1) year from date of substantial completion.
- C. Warranty:
 - 1. Manufacturer's products are expressly warranted for a period of one (1) year from purchase to be free from defects in material and workmanship, when installed according to manufacturer's published installation procedures. During the warranty period manufacturer will repair or at its option replace the products that are proven to be defective.

PART 2 - PRODUCTS

2.1 ACOUSTICAL BAFFLES

- A. Basis of Design Product: Subject to compliance with the requirements, provide panel products by one of the following manufacturers:
 - 1. Acoustical Baffles:
 - a. Kinetics Noise Control, Inc.: kBar Absorptive Baffles (Basis of Design)
 - b. Arktura: SoundBar
 - c. Soelberg: Muto Blox
 - 2. Dimensions: 2 -1/2 inches wide minimum by 12 inches high.
 - 3. Configurations: Baffle runs shown in drawings based on 8 feet and 6 feet individual units. Refer to drawings for mounting height from finished floor level.
 - 4. Housing Material: 9 mm thick minimum 100% polyester fiber (PET).
 - 5. Edge Detail: Square edges.
 - 6. Color:
 - a. Kinetics Noise Control, Inc.: Scarlet
 - b. Arktura: Apple
 - c. Soelberg: Chili Pepper
 - 7. Sound Absorption: NRC 0.60 minimum.
 - 8. Install Method: Suspended with metal suspension system.

2.2 METAL SUSPENSION SYSTEM

- A. Basis of Design Product: Subject to compliance with the requirements, provide metal suspension accessories for suspended acoustical baffle products by one of the following:
1. Acoustical Baffles:
 - a. Kinetics Noise Control, Inc.: Treaded Assemblies.
 - b. Arktura: All Tread Assemblies.
 - c. Soelberg: 1/4 inch -20 Treaded Couplers System.
 2. Mounting:
 - a. Suspended to structural deck with connector screws and treaded cables per manufacturer's installation recommendations.

2.3 ATTACHMENT SYSTEM

- A. Installation Hardware:
1. The systems will be designed to receive threaded cable assemblies or stainless steel wire rope via channel nut and flat plate, provided by contractor. Threaded cable or stainless steel wire rope shall be attached to structural ceiling in accordance with structurally engineered design.
- A. Stainless Steel Wire Rope: Wire rope manufactured from stainless steel wire complying with ASTM A492, Type 316.
1. Manufacturers: Subject to compliance with requirements, provide products by, but not limited to, one of the following:
 - a. Lexco Cable.
 - b. Loos & Co. Inc.
 - c. Suncor Stainless, Inc.
 2. Size: Wire rope sufficient for its stress at three times hanger design load (ASTM C635/C635M, Table 1, "Direct Hung") will be less than yield stress of wire, but not less than minimum 1 x 19 wire rope, 1/8" diameter.
- B. Wire Rope Fittings: Stainless steel connectors, Type 316, with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
1. Properly sized machine swage sleeves can be used where wire rope connections are not visible.
 2. Mechanical swage receivers (swageless) sized for wire rope size are to be used at exposed locations, where wire rope attaches to overhead structure or framing. Receiver to have bolt, wood stud, or other connecting attachment as part of the unit.

PART 3 – EXECUTION

3.1 PREPARATION

- A. Field verify ceiling area and establish layout of ceiling baffles and attachment locations. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation. Ceiling baffle substructure shall be level and plumb. Ceiling baffle substructure shall be structurally sound as determined by that subcontractor's engineer. Ceiling baffle substructure shall be free of defects detrimental to work and erected in accordance with established building tolerances.
- B. Coordinate ceiling baffle layout with mechanical, electrical and sprinkler fixtures as required.
- C. Coordinate delivery of such items to project site.

3.2 INSTALLATION

- A. Install baffles in accordance with the manufacturer's instructions and in compliance with the authorities having jurisdiction.
- B. Erect ceiling baffles level and plumb, in proper alignment in relation to substructure framing and established lines.
- C. Baffles anchorage shall be structurally sound and per engineering recommendations.
- D. Locate and place ceiling baffles level, plumb, and at indicated alignment with adjacent work.
- E. At locations where ceiling suspension wires are exposed, use stainless steel wire rope. Secure roping to ceiling suspension members and to supports with machine swaged sleeve connections. Suspend wire rope with swageless receivers from building's structural members as required for hangers, without attaching to permanent metal forms, steel deck, or steel deck tabs.

3.3 ADJUSTING AND CLEANING

- A. Replace damaged and broken baffles.
- B. Clean exposed surfaces of ceiling baffles modules that are not protected by temporary covering to remove fingerprints and soil during construction period.
- C. Protect ceiling baffles assemblies from damage during construction. Use temporary protective coverings where needed as approved by the ceiling baffle manufacturer.

END OF SECTION

SECTION 096400

WOOD FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Field-finished wood flooring.
2. Field-finished wood stair components.

1.2 SUBMITTALS

A. Product Data: For each type of product.

B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

C. Shop Drawings: For each type of floor assembly and accessory. Include plans, sections, and attachment details. Include expansion provisions and trim details.

D. Samples: For each exposed product and for each color and texture specified, approximately 12 inches long and of same thickness and material indicated for the Work and showing the full range of normal color and texture variations expected.

1.3 MOCKUPS

A. Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver wood flooring materials in unopened cartons or bundles.

B. Protect wood flooring from exposure to moisture. Do not deliver wood flooring until after concrete, masonry, plaster, ceramic tile, and similar wet-work is complete and dry.

C. Store wood flooring materials in a dry, warm, ventilated, weathertight location.

1.5 FIELD CONDITIONS

- A. Conditioning period begins not less than seven days before wood flooring installation, is continuous through installation, and continues not less than seven days after wood flooring installation.
 - 1. Environmental Conditioning: Maintain ambient temperature between 65 and 75 deg F (18 and 24 deg C) and relative humidity planned for building occupants in spaces to receive wood flooring during the conditioning period.
 - 2. Wood Flooring Conditioning: Move wood flooring into spaces where it will be installed, no later than the beginning of the conditioning period.
 - a. Do not install flooring until it adjusts to relative humidity of, and is at same temperature as, space where it is to be installed.
 - b. Open sealed packages to allow wood flooring to acclimatize immediately on moving flooring into spaces in which it will be installed.
- B. After conditioning period, maintain relative humidity and ambient temperature planned for building occupants.
- C. Install factory-finished wood flooring after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Hardwood Flooring: Comply with NWFA A500 for installation guidelines.
 - 1. Certification: Provide flooring that carries NWFA grade stamp on each bundle or piece.
- B. Maple Flooring: Comply with applicable MFMA grading rules for species, grade, and cut.
 - 1. Certification: Provide flooring that carries MFMA mark on each bundle or piece.

2.2 FIELD-FINISHED WOOD FLOORING

- A. Solid-Wood Flooring, Field-Finished: Kiln dried to 6 to 9 percent maximum moisture content; tongue and groove and end matched; with backs channeled.
 - 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. Aacer Flooring, LLC.
 - b. Carlisle Wide Plank Floors
 - c. WD Flooring, LLC.
 - 2. Grade and Species: MFMA-RL Second and Better Grade hard maple.
 - 3. Cut: Plain sawn.
 - 4. Thickness: 25/32 inch.
 - 5. Face Width: 3-1/8 inches.
 - 6. Lengths: Random-length strips complying with applicable grading rules.

- B. Urethane Finish System: Complete water-based system of compatible components that is recommended by finish manufacturer for application indicated.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BonaKemi USA Inc.
 - b. Dura Seal.
 - c. Hillyard, Inc.
 - d. MAPEI Corporation.
 - e. PoloPlaz Coatings.
 - 2. Stain: Penetrating and nonfading type.
 - a. Color: As selected by Architect from manufacturer's full range.
 - 3. Floor Sealer: Pliable, penetrating type.
 - 4. Finish Coats: Formulated for multicoat application on wood flooring.
- C. Wood Filler: Compatible with finish system components and recommended by filler and finish manufacturers for use indicated. If required to match approved Samples, provide pigmented filler.

2.3 INTERIOR WOOD STAIR COMPONENTS

- A. Architectural Woodwork Standards Grade: Custom.
- B. Wood for Transparent Finish:
 - 1. Species and Cut:
 - a. Risers: Hard maple, plain sawn.
 - b. Treads: Hard maple, plain sawn.
 - 2. Finish: Field finish, same urethane system as wood flooring.

2.4 ACCESSORY MATERIALS

- A. Wood Subfloor: As specified in Section 061600 "Sheathing."
- B. Asphalt-Saturated Felt: ASTM D4869/D4869M, Type II.
- C. Wood Flooring Adhesive: Mastic recommended by flooring and adhesive manufacturers for application indicated.
- D. Fasteners: As recommended by manufacturer, but not less than that recommended in NWFA's "Installation Guidelines."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of wood flooring.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Broom or vacuum clean substrates to be covered immediately before product installation. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 INSTALLATION

- A. Comply with flooring manufacturer's written installation instructions, but not less than applicable recommendations in NWFA's "Installation Guidelines."
- B. Wood Subfloor: Install according to requirements in Section 061600 "Sheathing."
- C. Provide expansion space at walls and other obstructions and terminations of flooring of not less than 3/4 inch.
- D. Vapor Retarder: Comply with the following for vapor retarder installation:
 - 1. Wood Flooring Nailed to Wood Subfloor: Install flooring over a layer of asphalt-saturated felt.
- E. Solid-Wood Flooring: Blind nail or staple flooring to substrate.
 - 1. Plank Flooring: For flooring of face width more than 3 inches.
 - a. Hardwood: Install countersunk screws at each end of each piece in addition to blind nailing. Cover screw heads with wood plugs glued flush with flooring.
- F. Stairs: Securely anchor treads and risers to supporting substrates.
 - 1. Install stairs with treads and risers no more than 1/8 inch from indicated position.
 - 2. Secure with countersunk, concealed fasteners and blind nailing.
 - 3. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with wood surface.

3.4 FIELD FINISHING

- A. Machine-sand flooring to remove offsets, ridges, cups, and sanding-machine marks that are noticeable after finishing. Vacuum and tack with a clean cloth immediately before applying finish.
 - 1. Comply with applicable recommendations in NWFA's "Installation Guidelines."

- B. Fill and repair wood flooring defects.
- C. Apply floor-finish materials in number of coats recommended by finish manufacturer for application indicated, but not less than one coat of floor sealer and three finish coats.
 - 1. Apply stains to achieve an even color distribution matching approved Samples.
 - 2. For water-based finishes, use finishing methods recommended by finish manufacturer to minimize grain raise.
- D. Cover wood flooring before finishing.
- E. Do not cover wood flooring after finishing until finish reaches full cure, and not before seven days after applying last finish coat.

3.5 PROTECTION

- A. Protect installed wood flooring during remainder of construction period with covering of heavy kraft paper or other suitable material. Do not use plastic sheet or film that might cause condensation.
 - 1. Do not move heavy and sharp objects directly over kraft-paper-covered wood flooring. Protect flooring with plywood or hardboard panels to prevent damage from storing or moving objects over flooring.

END OF SECTION

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. Vinyl molding accessories.
 - 4. Stainless steel wall base.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Product Schedule: For resilient base and accessory products. Use same designations indicated on Drawings.

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 for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

1.5 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).

1.6 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 (RB)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers listed on the drawings.
- B. Product Standard: ASTM F1861, 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.
- D. Height: 2 inches unless indicated otherwise on Drawings.
 - 1. Provide 6 inches at all Toilet Rooms.
- E. Lengths: Coils in manufacturer's standard length.
- F. Outside Corners: Job formed typical.
- G. Inside Corners: Job formed typical.
- H. Colors: As indicated by manufacturer's designations on Drawings.

2.2 RUBBER STAIR ACCESSORIES

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
 - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. Resilient Stair Treads:

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following manufacturers:
 - a. Tarkett/Johnsonite: Angle Fit Rubber Stair Treads
 - b. Roppe: Rubber Tread
 - c. Mannington: ColorScape Stair Treads

C. Rubber Stair Treads: ASTM F2169.

1. Type: TS (rubber, vulcanized thermoset).
2. Class: 2 (pattern; embossed)
 - a. Raised round with VI insert
3. Group: 1 (embedded abrasive strips).
4. Nosing Style: Square, adjustable to cover angles between 60 and 90 degrees.
5. Nosing Height: 2 inches.
6. Thickness: 1/4 inch and tapered to back edge.
7. Size: Lengths and depths to fit each stair tread in one piece.
8. Nonintegrated Risers: Smooth, flat; in height that fully covers substrate.

D. Locations: Provide rubber stair accessories in areas indicated

E. Colors and Patterns: As indicated by manufacturer's designations.

2.3 VINYL MOLDING ACCESSORIES

A. Basis of Design: Subject to compliance with requirements provide products by Tarkett or comparable products by:

1. Musson Rubber Co.
2. Roppe Corporation, USA.

B. Description: Vinyl reducers, joiners and transition strips.

1. Carpet to Concrete: Tarkett EG-XX-H.
 - a. Profile and Dimensions: 1 9/32-inch leg for 1/4 inch to floor transition.
2. Resilient Flooring to Resilient Flooring: Tarkett CTA-XX-K.
 - a. Profile and Dimensions: 2 1/2-inch overall width for 3/8 inch to 1/8 inch materials.
3. Resilient Flooring to Concrete: Tarkett SSR-XX-B.
 - a. Profile and Dimensions: 1 5/8-inch overall for 1/8 inch to floor transition.
4. Resilient Flooring to Concrete: Tarkett CTA-XX-P.
 - a. Profile and Dimensions: 2 1/2-inch overall for 3/8 inch to floor transition.
5. Colors and Patterns: As indicated by manufacturer's designations.

2.4 STAINLESS STEEL WALL BASE (SSB-1)

- A. Basis-Of-Design: Base Molding MX as manufactured by DiamondLife™ Brand.
 - 1. Material: Stainless steel, 22 gauge (0.030-inch) thick.
 - 2. Finish: Smooth, brushed.
 - 3. Height: 6-inches with 3/8-inch radius kick (coved)
 - 4. Mounting: Plain back, for adhering to wall substrate with construction adhesive.
 - 5. Provide pre-formed inside and outside corner sections based on jobsite conditions.

2.5 INSTALLATION MATERIALS

- A. Self-Leveling Underlayments, Trowelable Underlayments and Patching Compounds: Polymer-modified, portland cement based or blended hydraulic-cement-based formulation as specified in Section 091001 "Floor Preparation".
- 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 of width shown and 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 F710.
 - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.

2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
 - a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb. of water/1000 sq. ft. in 24 hours.
 - b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 5. Absorption (Porosity) Testing: Concrete substrates are to be tested to establish the substrates water absorption (porosity). This assessment will allow the determination of appropriate surface preparation and which of the manufacturer's primers are to be utilized.
 - a. Test for porosity per ASTM F3191.
 - b. Extremely absorbent concrete may require two applications of primer per manufacturer's instructions.
 - c. Concrete treated with admixture may be non-porous. Provide manufacturer's recommended primer.
 6. Adhesion Tests: After substrate preparation, test substrate for adhesion with resilient stair accessories according to manufacturer's written instructions.
- 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. Job-Formed Corners:
 - 1. Outside Corners: Use straight pieces of maximum lengths possible.
 - a. Form without producing discoloration (whitening) at bends.
 - b. Shave back of base at points where bends occur and remove strips perpendicular to length of base that are only deep enough to produce a snug fit without removing more than half the wall base thickness.
 - 2. Inside Corners: Use straight pieces of maximum lengths possible.
 - a. Form by cutting an inverted V-shaped notch in toe of wall base at the point where corner is formed. Shave back of base where necessary to produce a snug fit to substrate.

3.4 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 two coats.
- E. Cover resilient products subject to wear and foot traffic until Substantial Completion.

END OF SECTION

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. Rubber floor tile.
- 2. Vinyl enhanced floor tile.

B. Related Sections:

- 1. Section 024119 "Selective Structure Demolition" for removing existing floor coverings.
- 2. Section 091001 "Floor Preparation" for concrete testing, substrate preparation, condition requirements and installation of hydraulic cement based self-leveling, trowelable and fill underlayments at all locations to receive resilient tile flooring.
- 3. Section 096513 "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with resilient floor coverings.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.

B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

C. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

- 1. Show details of special patterns.

D. Product Schedule: For floor tile. Use same designations indicated on Drawings.

E. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation indicated.

- 1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

1.5 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 or more than 90 deg F. Store floor tiles on flat surfaces.

1.6 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
 - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- 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.

1.7 MAINTENANCE MATERIALS 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 1 box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- 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.

2.2 RUBBER FLOOR TILE

- A. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers listed on the drawings.
- B. Rubber Floor Tile Type RT-1, RT-2, RT-3 and RT-4:
 - 1. Product: See drawings.
 - 2. Tile Standard: ASTM F 1344, Class I-B, homogeneous rubber tile, through mottled.

3. Hardness: Grade 1, minimum hardness of 85, as required by ASTM F 1344, measured using Shore, Type A durometer per ASTM D 2240.
4. Wearing Surface:
 - a. RT-1 and RT-2: Textured. See drawings.
 - b. RT-3 and RT-4: Hammered.

C. Thickness: Minimum of 3.17 mm thick.

D. Size:

1. RT-1 and RT-2: Minimum of 12 by 24 inches.
2. RT-3 and RT-4: Minimum of 24 by 24 inches.

E. Colors and Patterns: See drawings.

2.3 VINYL ENHANCED FLOOR TILE

A. Manufacturers: Subject to compliance with requirements, provide products by the manufacturers listed on the drawings.

B. Vinyl Enhanced Floor Tile VET-1 and VET-2

1. Product: See drawings.
2. Tile Standard:
 - a. ASTM F 1066, Class 3, through-pattern tile.
 - b. ASTM F 2982, Standard Specification for Polyester Composition Floor Tile.
3. Wearing Surface: Smooth.
4. Thickness: 0.125 inch.
5. Size: Minimum of 12 by 12 inches.
6. Tiles to contain a minimum of 23% pre-consumer recycled content.
7. Colors and Patterns: See drawings.

2.4 INSTALLATION MATERIALS

A. Trowelable Underlayments and Patching Compounds: Polymer-modified, portland cement based or blended hydraulic-cement-based formulation as specified in Section 091001 "Floor Preparation".

B. Adhesives: Water-resistant type recommended by manufacturer to suit floor tile and substrate conditions indicated.

1. Refer to Part Three, Preparation for Absorption (Porosity) Testing. Assessment of test results is to determine floor finish manufactures recommended adhesive.

C. Floor Polish: Provide protective liquid floor polish products as recommended by 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.
- B. 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.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Verify substrates have been prepared according to manufacturer's written instructions to ensure adhesion of resilient products. Where flooring manufacturers instruction conflict with the floor preparation requirements listed, the most stringent requirements shall apply.
- B. Concrete Substrates: Concrete substrates are to be prepared, cleaned and tested per 091001 Floor Preparation.
 - 1. Entire floor substrate is to have trowelable underlayment or self-leveling underlayment applied to produce a uniform and smooth substrate.
 - 2. Absorption (Porosity) Testing: Underlayment substrates are to be tested to establish the substrates water absorption (porosity). This assessment will allow the determination of appropriate surface preparation and which of the manufacturer's primers are to be utilized.
 - a. Test for porosity per ASTM F3191.
 - b. Extremely absorbent underlayment may require two applications of primer per manufacturer's instructions.
 - c. Provide manufacturer's recommended primers and adhesives if underlayment is verified to be non-porous.
- C. Adhesion Bond Testing: After substrate preparation, test flooring for adhesion to substrate according to manufacturer's written instructions.
 - 1. Bond test must be performed using the actual flooring and adhesive to be installed. Evaluate for bond strength to substrate to verify manufacturers requirements are met.
- D. Do not install floor tiles until they are same temperature as space where they are to be installed.
 - 1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

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 square with room axis unless noted or shown otherwise.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
 - 1. Lay tiles with grain running in one direction unless noted or shown otherwise.
- 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.
 - 1. Provide sealant at juncture of all door frames and flooring. Sealant to match door frame color.
- 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, nonstaining marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor 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 flooring 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.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor tile.
- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.
- C. Protect floor tile products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
- D. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor tile surfaces before applying liquid floor polish.
 - 1. Apply two coats.
- E. Cover floor tile until Substantial Completion.

END OF SECTION

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. This Section includes modular carpet tile.
- B. Related Sections include the following:
 - 1. Division 09 Section "Floor Preparation" for concrete testing, substrate preparation, condition requirements and installation of hydraulic cement based self-leveling, trowelable and fill underlayments at all locations to receive tile carpeting.
 - 2. Division 09 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETING

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings: Show 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.

- D. 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- long Samples.
- E. Product Schedule: For carpet tile. Use same designations indicated on Drawings.
- F. 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.
- G. Sample Warranty: For special warranty specified in this Section.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.
- B. Fire-Test-Response Characteristics: Provide products with the critical radiant flux classification indicated in Part 2, as determined by testing identical products per ASTM E 648 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104, Section 4.0, "Storage and Handling."

1.7 FIELD CONDITIONS

- A. Comply with CRI 104, Section 7.0, "Site Conditions" for temperature, humidity and ventilation limitations.
- B. Environmental Limitations: Do not 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 the levels indicated for Project when occupied for its intended use.
- 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.

1.8 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which 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, runs,
 - b. Dimensional stability.
 - 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.

1.9 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

PART 2 - PRODUCTS

2.1 CARPET TILE

- A. Carpet Tile TC-1:
 1. Manufacturer/Product Name: Subject to compliance with requirements, provide products by the manufacturers listed on the drawings.
 2. Color and Pattern: See drawings.
 3. Fiber Content: 100 percent nylon 6, 6 or 100 percent nylon 6.
 4. Dye Method: 100 percent solution dyed.
 5. Pile Characteristic: Level-loop pile.
 6. Primary Backing/Backcoating: Manufacturer's standard composite materials.
 7. Secondary Backing: Manufacturer's standard material to be performance backing system that will provide a moisture barrier impervious to water damage.
 8. Size: See drawings.
 9. Applied Soil-Resistance Treatment: Manufacturer's standard treatment.
 10. Antimicrobial Treatment: Manufacturer's standard treatment that protects carpet 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; no fungal growth; per AATCC 174.
 11. Performance Characteristics: As follows:
 - a. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm.
 - b. Dry Breaking Strength: Not less than 100 lbf per ASTM D 2646.
 - c. Tuft Bind: TBD, Not less than 3 lbf per ASTM D 1335.
 - d. Delamination: Not less than 3.5 lbf/in. per ASTM D 3936.

- e. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) per AATCC 16, Option E.
- f. Electrostatic Propensity: TBD, Less than [3.5] [2] kV per AATCC 134.
- g. Environmental Requirements: Provide carpet tile that complies with testing and product requirements of Carpet and Rug Institute's "Green Label Plus" program.

2.2 CARPET WALK-OFF TILE

A. Type CWOT-1

- 1. Manufacturer/Product Name: Subject to compliance with requirements, provide products by the manufacturers listed on the drawings.
- 2. Color and Pattern: See drawings.
- 3. Construction: Textured patterned loop.
- 4. Primary Backing/Backcoating: Manufacturer's standard materials. Reinforced amorphous resin.
- 5. Secondary Backing: Manufacturer's standard material.
- 6. Size: See drawings.
- 7. Applied Soil-Resistance Treatment: Manufacturer's standard material.
- 8. Antimicrobial Treatment: Manufacturer's standard material.
- 9. Critical Radiant Flux Classification: Not less than 0.45 W /sq. cm.

2.3 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: See Section 091001 Floor Preparation for products to be used for substrate preparation.
- B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
 - 1. Refer to Part Three, Execution, for Absorption (Porosity) Testing. Assessment of test results is to determine floor finish manufactures recommended adhesive.

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.
- B. 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 coverings.
- C. Examine carpet tile for type, color, pattern, and potential defects.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 8.0, "Substrate Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Concrete Substrates: Concrete substrates are to be prepared, cleaned and tested per 091001 Floor Preparation.
 - 1. Entire floor substrate is to have trowelable underlayment or self-leveling underlayment applied to produce a uniform and smooth substrate.
 - 2. Absorption (Porosity) Testing: Concrete substrates are to be tested to establish the substrates water absorption (porosity). This assessment will allow the determination of appropriate surface preparation and which of the manufacturer's primers are to be utilized.
 - a. Test for porosity per ASTM F3191.
 - b. Extremely absorbent concrete may require two applications of primer per manufacturer's instructions.
 - c. Concrete treated with admixture may be non-porous. Provide manufacturer's recommended primer.
 - 3. Adhesion Bond Tests: After substrate preparation, test substrate for adhesion with carpeting according to manufacturer's written instructions.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 10, "Carpet Tile Installation," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer. Glue down; install every tile with full-spread, releasable, pressure-sensitive adhesive.
- 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 finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.

3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
 - 1. Remove excess adhesive, seam sealer, 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 104, Section 13.7, "Post Installation."
- 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

SECTION 099113
EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Concrete and Asphalt.
2. Clay masonry.
3. Concrete masonry units (CMU).
4. Steel.
5. Galvanized metal.
6. Aluminum (not anodized or otherwise coated).
7. Wood.
8. Plastic trim fabrications.
9. Exterior portland cement (stucco).
10. Exterior gypsum board.

- B. This Section includes surface preparation and the applications of wood finishes on the following exterior substrates:

1. Exposed glue-laminated beams and columns.
2. Exposed dimension lumber (rough carpentry).
3. Dressed lumber (finish carpentry).
4. Exposed wood panel products.
5. Wood decks and stairs.
6. Wood shingles and shakes (excluding roofs).

- C. Related Sections include the following:

1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
2. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

- C. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.6 EXTRA MATERIALS

- A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.
 - 1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis of Design: Subject to compliance with requirements provide products by the Sherwin Williams Company or comparable products by the following:
 - 1. Benjamin Moore & Co.
 - 2. Pratt and Lambert.

2.2 PAINT, GENERAL

- A. Material Compatibility:
 - 1. Provide materials for use within each paint system 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.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

- B. Colors: As indicated on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Plaster: 12 percent.
 - 5. Gypsum Board: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 - 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 - 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

- E. Clay Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.
- F. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- G. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove surface oxidation.
- J. Wood Substrates (Paint):
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Wood Substrates (Staining and Transparent Finishes):
 - 1. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
 - a. Remove surface dirt, oil, or grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - b. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
 - c. Countersink steel nails, if used, and fill with putty tinted to final color to eliminate rust leach stains.
 - 2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.
- L. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.
- M. Plaster Substrates: Do not begin paint application until plaster is fully cured and dry.
- N. Exterior Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
- O. Asphalt Pavement Substrates: Asphalt must be cured to extent permitted by the manufacturer.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.

1. Use applicators and techniques suited for paint and substrate indicated.
 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
1. Owner may engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 2. Testing agency will perform tests for compliance of paint materials with product requirements.
 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

- A. Concrete and Asphalt Substrates (Markings on Traffic Surfaces):
1. Latex System:

- a. One coat Setfast Acrylic Waterborne Traffic Marking flat 15 mils WFT/7 mils DFT.
- B. Concrete Substrates, Nontraffic and Traffic Surfaces:
 1. Water Based Concrete Pavement Coating: Pigmented coating suitable for vehicular traffic surfaces and other exterior concrete surfaces.
 - a. First Coat: Coating, matching topcoat.
 - b. Topcoat: Coating, Water based, for concrete pavement.
 - 1) Manufacturer/Product: Sherwin-Williams, H & C Products Group, H & C Heavy Shield Water Based Solid Color.
 - c. Location: See Drawings.
 - d. Color: Charcoal See drawings.
- C. CMU Substrates:
 1. Latex System (Existing Substrates) :
 - a. Prime Coat: One coat Loxon Block Surfacer A24W200 16 mils WFT/8 mils DFT.
 - b. Topcoats: Two coats A-100 satin 4 mils WFT/1.3 mils DFT per coat.
 2. Latex Over Alkali – Resistant Primer System (New Substrates):
 - a. Prime Coat: One coat Loxon Block Surfacer A24W200 8 mils DFT.
 - b. Topcoats: Two coats A-100 satin 4 mils WFT/1.3 mils DFT per coat.
- D. Steel Substrate:
 1. Acrylic Over Water-Based Primer System:
 - a. Prime Coat: One coat Pro-Cryl Universal Metal Primer B66-310 Series 6 mils WFT / 3 mils DFT.
 - b. Topcoats: Two coats Pro Industrial Acrylic B66-650 Series 2.5-4.0 mils DFT.
 2. High Performance Polyurethane, Pigmented Coating System:
 - a. Prime Coat: One coat Macropoxy 646 FC Epoxy B58-600 Series @ 5-10 mils DFT.
 - b. Topcoats: Two coats SW Hi-Solids Polyurethane B65-350 series @ 3-5 mils DFT.
- E. Galvanized and Galvannealed Metal Substrates (All masonry lintels and exposed galvanized steel):
 1. Acrylic Over Water-Based Primer System:
 - a. Prime Coat: One coat Pro-Cryl Universal Water Based Primer B66-310 series 5 mils WFT/2 mils DFT.
 - b. Topcoats: Two coats Pro Industrial Acrylic B66-650 Series 2.5-4.0 mils DFT.
 2. High Performance Polyurethane Pigmented Coating System:
 - a. Prime Coat: One coat Macropoxy 646 FC Epoxy B58-600 Series @ 5-10 mils DFT.
 - b. Topcoats: Two coats SW Hi-Solids Polyurethane B65-350 Series @ 3-5 mils DFT.
- F. Aluminum Substrates:

1. Latex Systems:
 - a. Prime Coat: One coat Pro-Cryl Universal Water Based Primer B66-310 series 5 mils WFT/2 mils DFT.
 - b. Topcoats: Two coats Pro Industrial Acrylic B66-650 Series 2.5-4.0 mils DFT.

- G. Wood Substrates:
 1. Latex System:
 - a. Prime Coat: One coat Exterior Latex Wood Primer B42W8041 4 mils WFT/2.3 mils DFT.
 - b. Topcoats: Two coats A-100 satin 4 mils WFT/1.3 mils DFT per coat.

- H. Plastic Trim Fabrication Substrates:
 1. Latex System:
 - a. Prime Coat: One coat SW Extreme Bond Primer B51W150 @ 3.1 mils WFT / .9 mils DFT.
 - b. Topcoats: Two coats A-100 Satin 4 mils WFT/1.3 mils DFT per coat.

- I. Stucco and Vertical Concrete Substrates:
 1. Latex Systems (Existing Substrate):
 - a. Prime Coat: One coat Loxon Masonry Primer A24W300 8 mils WFT/3.2 mils DFT.
 - b. Topcoats: Two coats A-100 satin 4 mils WFT/1.3 mils DFT per coat.
 2. Latex Over Alkali-Resistant Primer System (New Substrates):
 - a. Prime Coat: One coat Loxon Masonry Primer A24W300 8 mils WFT/3.2 mils DFT.
 - b. Topcoats: Two coats A-100 satin 4 mils WFT/1.3 mils DFT per coat.

- J. Wood Substrates Stain and Transparent Finishes:
 1. Solid-Color Latex Stain System:
 - a. Two Stain Coats: Woodscapes A15 Series exterior solid color latex stain 4 mils WFT/1.3 mils DFT per coat.
 2. Semitransparent Stain System:
 - a. Two Stain Coats: Woodscapes Semi-Transparent Latex Stain A15T5 exterior semi-transparent stain (Water Based).

- K. Exterior Gypsum Board Ceiling and Soffit Substrates:
 1. Water Based Epoxy Coating System, One Component Epoxy: (For walls/soffits/ceilings at Patient Porches).
 - a. Prime Coat: One coat ProMar 200 Zero VOC Latex primer 4 mils WFT/1.3 mils DFT.

- b. Topcoats: Two coats Pro Industrial Pre-Catalyzed Water Based Epoxy K45-150 Series, Eg-Shel, 6.5 mils WFT/2.5 mils DFT per coat.

END OF SECTION

SECTION 099123
INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following interior substrates:
 - 1. Concrete (vertical and overhead).
 - 2. Concrete masonry units (CMU).
 - 3. Steel.
 - 4. Galvanized metal.
 - 5. Aluminum (not anodized or otherwise coated).
 - 6. Wood.
 - 7. Gypsum board.
 - 8. Cotton or canvas insulation covering.
 - 9. Wood stain and transparent finishes.
 - 10. Concrete floors.
- B. This Section includes surface preparation and the application of wood finishes on the following interior substrates:
 - 1. Exposed dimension lumber (rough carpentry).
 - 2. Dressed lumber (finish carpentry).
 - 3. Exposed wood panel products.
- C. Related Sections include the following:
 - 1. Division 05 Sections for shop priming of metal substrates with primers specified in this Section.
 - 2. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1.6 EXTRA MATERIALS

A. Furnish extra materials described below that are from same production run (batch mix) as materials applied and that are packaged for storage and identified with labels describing contents.

1. Quantity: Furnish an additional 5 percent, but not less than 1 gal. of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis of Design: Subject to compliance with requirements provide paints by the Sherwin Williams Company or comparable products by the following:

1. Benjamin Moore & Co.
2. Pratt and Lambert.

2.2 PAINT, GENERAL

A. Material Compatibility:

1. Provide materials for use within each paint system 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.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- B. Colors: As indicated on the Drawings.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Concrete: 12 percent.
 2. Masonry (Clay and CMU): 12 percent.
 3. Wood: 15 percent.
 4. Gypsum Board: 12 percent.
 5. Plaster: 12 percent.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- D. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Remove plates, machined surfaces, and similar items already in place that are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
 2. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
- C. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.

- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
 - 1. Concrete Floors: Remove oil, dust, grease, dirt, and other foreign materials. Comply with SSPC-SP-13/NACE 6 or ICRI No. 310.2. Perform the following minimum preparation. Perform additional methods if the following does not produce the adequate profile and porosity.
 - a. Use floor buffing machine or power tool with 60 to 80 Grit pads for sanding concrete surfaces. Vacuum clean surfaces of materials removed by sanding.
- E. Clay Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content of surfaces or alkalinity of mortar joints to be painted exceed that permitted in manufacturer's written instructions.
- F. Concrete Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- G. Steel Substrates: Remove rust and loose mill scale. Clean using methods recommended in writing by paint manufacturer.
- H. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- I. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- J. Aluminum Substrates: Remove surface oxidation.
- K. Wood Substrates (Paint):
 - 1. Scrape and clean knots and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- L. Wood Substrates (Staining and Transparent Finishes):
 - 1. Clean and prepare surfaces to be finished according to manufacturer's written instructions for each particular substrate condition and as specified.
 - a. Remove surface dirt, oil, or grease by washing with a detergent solution; rinse thoroughly with clean water and allow to dry. Remove grade stamps and pencil marks by sanding lightly. Remove loose wood fibers by brushing.
 - b. Remove mildew by scrubbing with a commercial wash formulated for mildew removal and as recommended by stain manufacturer.
 - c. Countersink steel nails, if used, and fill with putty tinted to final color to eliminate rust leach stains.
 - 2. Apply wood filler paste to open-grain woods, as defined in "MPI Architectural Painting Specification Manual," to produce smooth, glasslike finish.

- M. Gypsum Board Substrates: Do not begin paint application until finishing compound is dry and sanded smooth.
 - 1. Existing painted gypsum board substrates must be thoroughly cleaned to remove all dirt, oils and mold or mildew. Lightly sand surfaces after cleaning. Primer is to still be applied as part of the scheduled paint system.
- N. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Mechanical and Electrical Work: Paint items exposed in equipment rooms and occupied spaces including, but not limited to, the following:
 - 1. Mechanical Work:
 - a. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Tanks that do not have factory-applied final finishes.
 - e. Visible portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets.
 - f. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
 - g. Mechanical equipment that is indicated to have a factory-primed finish for field painting.
 - 2. Specific Mechanical Item Paint Colors:
 - a. Fire Protection metal piping to be painted red.

b. Natural Gas metal piping to be painted safety yellow

3. Electrical Work:

- a. Electrical equipment that is indicated to have a factory-primed finish for field painting.
- b. Electrical conduit that is surface mounted on painted walls.

3.4 FIELD QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:

- 1. Owner may engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
- 2. Testing agency will perform tests for compliance with product requirements.
- 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates (Vertical and overhead):

- 1. Latex System.
 - a. Prime Coat: One coat Loxon Concrete & Masonry Primer/Sealer, 5.3 - 8.0 mils WFT/2.1 - 3.2 mils DFT.
 - b. Topcoats: Two coats Pro Mar 200 Latex Zero VOC eggshell, 4 mils WFT/1.6 mils DFT per coat.
- 2. Water Based Epoxy Latex System (Where indicated):
 - a. Prime Coat: One coat Loxon Concrete & Masonry Primer/Sealer, 5.3 - 8.0 mils WFT/2.1 - 3.2 mils DFT.

- b. Topcoat: Two coats Pro Industrial Water Based Catalyzed Epoxy B73-360 Series Eg-Shel, 5-12 mils WFT/2-5 mils DFT per coat.
- B. CMU Substrates:
- 1. Latex System (Standard for CMU walls):
 - a. Prime Coat: One coat Prep Rite Block Filler B25W25, 4 mils WFT/1.6 mils DFT.
 - b. Topcoats: Two coats Pro Mar 200 Latex Zero VOC eggshell, 4 mils WFT/1.6 mils DFT per coat.
 - 1. Water Based Epoxy System (Where indicated):
 - a. Prime Coat: One coat Heavy Duty Block Filler B42W46, 18 mils WFT/10 mils DFT.
 - b. Topcoat: Two coats Pro Industrial Water Based Catalyzed Epoxy B73-360 Series Eg-Shel, 5-12 mils WFT/2-5 mils DFT per coat.
- C. Steel Substrates:
- 1. Prime Finish General Note: Manufacturer of products will typically have standard primer applied. Primer to be compatible to final coatings listed or match the listed primers.
 - a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with ANSI/SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.
 - 2. Water Based Dry-Fall System (Overhead steel structure):
 - a. Prime Coat: One coat Pro-Cryl Universal Primer B66-310 Series 6.5 mils WFT / 2.5 mils DFT.
 - b. Topcoat: Two coats Waterborne Acrylic Dry Fall Eggshell, B42W00082-White, 5 mils WFT/ 3 mils DFT per coat.
 - 3. Latex Over Acrylic Primer System: (Miscellaneous metal, metal doors and frames (including coated/galvannealed base metal), access doors and frames, metal light frames in wood doors and other):
 - a. Prime Coat: One coat Pro-Cryl Universal Primer B66-310 Series 6.5 mils WFT/2.5 mils DFT.
 - b. Topcoat: Two coats Pro Industrial Acrylic B66-650 Semi-Gloss, 2.5-4.0 mils DFT.
 - 4. Water Based Epoxy Coating System, Two Component Epoxy (Handrails, guardrails and other items indicated to be epoxy painted):
 - a. Prime Coat: One coat Pro-Cryl Universal Primer B66-310 Series 6.5 mils WFT/2.5 mils DFT.
 - b. Topcoat: Two coats Pro Industrial Water Based Catalyzed Epoxy B73-360 Series Eggshell, 6.5 mils WFT/2.5 mils DFT.
- D. Galvanized and Galvannealed-Metal Substrates:
- 1. Water-Based Dry Fall System (Metal decking and other):
 - a. One coat primer per manufacturer's recommendations.

- b. Topcoat: Two coats Waterborne Acrylic Dryfall Eggshell, B42W00082-White, 5 mils WFT/3 mils DFT per coat.
 - c. Test patch for adhesion to be approved by Architect before installation.
 2. Water Based Epoxy Coating System Two Component Epoxy (Galvanized steel items indicated to be epoxy painted):
 - a. Prime Coat: One coat Pro-Cryl Universal Primer B66-310 Series 6.5 mils WFT/2.5 mils DFT.
 - b. Topcoat: Two coats Pro Industrial Water Based Catalyzed Epoxy B73-360 Series Eggshell, 6.5 mils WFT/2.5 mils DFT.
 - E. Aluminum Substrate (Not anodized or otherwise coated.):
 1. Water Based, Light Industrial Coating System:
 - a. Prime Coat: One coat Pro-Cryl Universal Primer B66-310 Series, 6.5 mils WFT / 2.5 mils DFT.
 - b. Topcoat: Two coats Pro Industrial Water Based Catalyzed Epoxy B73-360 Series Eggshell, 6.5 mils WFT/2.5 mils DFT.
 - F. Wood Substrates (Dimension lumber, finish lumber, panel products):
 1. Latex System:
 - a. Prime Coat: One coat Premium Wall & Wood Primer B28W8111, 1.8 mils DFT.
 - b. Topcoat: Two coats Pro Industrial Acrylic Semi-Gloss, 4 mils WFT/1.4 mils DFT per coat.
 - G. Gypsum Board Substrates:
 1. Latex System One (Standard for walls):
 - a. Prime Coat: One coat ProMar 200 Zero VOC Latex Primer, 4 mils WFT/1.3 mils DFT.
 - b. Topcoats: Two coats ProMar 200 Zero VOC Latex Eggshell. 4 mils WFT/1.6 mils DFT per coat.
 2. Latex System Two (Standard for soffits and ceilings):
 - a. Prime Coat: One coat ProMar 200 Zero VOC latex Primer, 4 mils WFT/1.3 mils DFT.
 - b. Topcoats: Two coats Pro Mar 200 Zero VOC Latex Flat, 4 mils WFT/1.6 mils DFT per coat.
 3. Latex System Three (Standard for walls/soffits/ceilings at wet areas and toilet rooms not indicated to be Epoxy):
 - a. Prime Coat: One coat ProMar 200 Zero VOC Latex Primer, 4 mils WFT/1.3 mils DFT.
 - b. Topcoats: Two coats ProMar 200 Zero VOC Latex Semi-Gloss. 4 mils WFT/1.8 mils DFT per coat.

4. Water Based Epoxy Coating System: (Where indicated):
 - a. Prime Coat: One coat ProMar 200 Zero VOC Latex primer 4 mils WFT/1.3 mils DFT.
 - b. Topcoats: Two coats Pro Industrial Water Pre-Catalyzed Water Based Epoxy K45-150 Series Eg-Shel [K46-150 Series Semi-Gloss], 6.5 mils WFT/2.5 mils DFT per coat.
 5. Latex System Four (Primer for Wall Coverings):
 - a. Prime Coat: One coat Multi-Purpose Latex Primer 4 mils WFT/ 1.4 mils DFT.
 6. Latex System Five (Gypsum Board Finish Level 5):
 - a. Prime Coat: One coat Builders Solution System Interior Latex Primer/Surfacers A63W100, 4 mils WFT/1.8 mils DFT.
 - b. Topcoats: Two coats Pro Mar 200 Zero VOC Latex eggshell. 4 mils WFT/1.8 mils DFT per coat.
- H. Cotton or Canvas Insulation Covering Substrates:
1. Latex System:
 - a. Prime Coat: One coat DTM Primer/Finish B66W1 5 mils WFT/2.5 mils DFT.
 - b. Topcoats: Two coats DTM Acrylic semi-gloss B66-200 6.5 mils WFT/2.5 mils DFT.
- I. Wood Substrates Stain and Transparent Finishes:
1. Waterborne Clear Acrylic Over Stain System:
 - a. Stain coat: Minwax Performance Series Tintable Wood Stain 250.
 - b. Two Finish coats: SW Minwax Water Based Oil-Modified Polyurethane, Satin, 4 mils WFT/1.7 mils DFT per coat.
 2. Waterborne Clear Acrylic.
 - a. Two Finish coats: SW Minwax Water Based Oil-Modified Polyurethane, Satin, 4 mils WFT/1.7 mils DFT per coat.
- J. Concrete Floor Substrates, Nontraffic and Traffic Surfaces (SC):
1. See substrate preparation required for concrete surfaces in Part 3, 3.2 Preparation.
 2. Water Based Concrete Floor Clear Sealer System: Basic clear concrete sealer.
 - a. First Coat: Sealer, matching topcoat.
 - b. Topcoat: Sealer, Water based, for concrete floors.
 - 1) Manufacturer/Product: Sherwin-Williams, H & C Products Group, H & C Clarishield Water Based Wet Look Sealer.
 - 2) H & C Sharkgrip Slip Resistant Additive shall be added to the final coat per manufacturer's instructions.

END OF SECTION

SECTION 101100
VISUAL DISPLAY SURFACES

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. Markerboards.
 - 2. Tackboards.

1.3 DEFINITIONS

- A. Tackboard: Framed or unframed, tackable, visual display board assembly.
- B. Visual Display Board Assembly: Visual display surface that is factory fabricated into composite panel form, either with or without a perimeter frame; includes chalkboards, markerboards, and tackboards.
- C. Visual Display Surface: Surfaces that are used to convey information visually, including surfaces of chalkboards, markerboards, tackboards, and surfacing materials that are not fabricated into composite panel form but are applied directly to walls.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for visual display surfaces.
- B. LEED Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings: For visual display surfaces. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Show locations of panel joints.
 - 2. Include sections of typical trim members.
- D. Samples for Initial Selection: For each type of visual display surface indicated, for units with factory-applied color finishes, and as follows:
 - 1. Actual sections of porcelain-enamel face sheet.
 - 2. Swatches of tack surface and board assemblies.

12-17/06-08

3. Include accessory Samples to verify color selected.

E. Product Schedule: For visual display surfaces. Use same designations indicated on Drawings.

F. Maintenance Data: For visual display surfaces to include in maintenance manuals.

G. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain visual display surfaces from single source from single manufacturer.

B. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 50 or less.

C. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver factory-built visual display surfaces completely assembled in one piece without joints, where possible. If dimensions exceed maximum manufactured panel size, provide two or more pieces of equal length as acceptable to Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site.

B. Store visual display surfaces vertically with packing materials between each unit.

1.7 PROJECT CONDITIONS

A. Environmental Limitations: Do not deliver or install visual display surfaces until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

B. Field Measurements: Verify actual dimensions of construction contiguous with visual display surfaces by field measurements before fabrication.

1. Allow for trimming and fitting where taking field measurements before fabrication might delay the Work.

1.8 WARRANTY

A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer's standard form in which manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

12-17/06-08

- a. Surfaces lose original writing and erasing qualities.
 - b. Surfaces exhibit crazing, cracking, or flaking.
2. Warranty Period: 50 years from date of Substantial Completion.
 3. Warranty Period: Life of the building.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Porcelain-Enamel Face Sheet: Manufacturer's standard steel sheet with porcelain-enamel coating fused to steel; uncoated thickness indicated.
 1. Gloss Finish: Gloss as indicated; dry-erase markers wipe clean with dry cloth or standard eraser.
- B. Hardboard: ANSI A135.4, tempered.
- C. Particleboard: ANSI A208.1, Grade M-1, made with binder containing no urea formaldehyde.
- D. Extruded Aluminum: ASTM B 221, Alloy 6063.

2.2 MARKERBOARD ASSEMBLIES (MB)

- A. Porcelain-Enamel Markerboards: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction consisting of backing sheet, core material, and minimum 0.021-inch-thick, porcelain-enamel face sheet with low-gloss finish.
 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Claridge Products and Equipment, Inc.
 - b. Marsh Industries, Inc.; Visual Products Group.
 - c. Platinum Visual Systems; a division of ABC School Equipment, Inc.
 - d. PolyVision Corporation; a Steelcase company.
 2. Particleboard Core: 1/2 inch thick; with 0.005-inch-thick, aluminum foil backing.
 3. Laminating Adhesive: Manufacturer's standard, moisture-resistant thermoplastic type.

2.3 TACKBOARD ASSEMBLIES (TB)

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Forbo Flooring Systems
 2. Claridge Products and Equipment, Inc.
 3. Koroseal
- B. Tackboard material: 1/4-inch-thick, factory made homogeneous tackable surface material made of primary natural materials consisting of linseed oil, cork, rosin binders and dry pigments mixed and calendared onto a natural jute backing.

12-17/06-08

- C. Aluminum Frames: Fabricated from not less than 0.062-inch- thick, extruded aluminum; standard size and shape.

2.4 FABRICATION

- A. Porcelain-Enamel Visual Display Assemblies: Laminate porcelain-enamel face sheet and backing sheet to core material under heat and pressure with manufacturer's standard flexible, waterproof adhesive.
- B. Aluminum Frames: Fabricate units straight and of single lengths, keeping joints to a minimum. Miter corners to a neat, hairline closure.
 - 1. Where factory-applied trim is indicated, trim shall be assembled and attached to visual display units at manufacturer's factory before shipment.

2.5 GENERAL FINISH REQUIREMENTS

- 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: 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.

2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

2.7 VISUAL DISPLAY SURFACE SCHEDULE

- A. Visual Display Board; Factory assembled.
 - 1. Markerboard: Porcelain-enamel markerboard assembly.
 - a. Color: White.
 - 2. Corners: Square.
 - 3. Width: As indicated on Drawings.
 - 4. Height: As indicated on Drawings.
 - 5. Mounting: Wall.
 - 6. Mounting Height: As indicated on Drawings.
 - 7. Factory-Applied Aluminum Trim: Manufacturer's standard with clear anodic finish.
 - 8. Accessories:
 - a. Chalktray: Solid type.

- B. Tackboard; Factory assembled.
 - 1. Tack Surface: 1/4-inch- thick, factory made homogeneous tackable surface material made of primary natural materials consisting of linseed oil, cork, rosin binders and dry pigments mixed and calendared onto a natural jute backing.
 - a. Color: As selected by Architect from full range of industry colors.
 - 2. Corners: Square.
 - 3. Width: As indicated on Drawings.
 - 4. Height: As indicated on Drawings.
 - 5. Mounting: Wall.
 - 6. Mounting Height: As indicated on Drawings.
 - 7. Edges: Concealed by trim.
 - a. Factory-Applied Aluminum Trim: Manufacturer's standard style, with clear anodic finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Examine roughing-in for electrical power systems to verify actual locations of connections before installation of motor-operated, sliding visual display units.
- C. Examine walls and partitions for proper preparation and backing for visual display surfaces.
- D. Examine walls and partitions for suitable framing depth where sliding visual display units will be installed.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair the performance of and affect the smooth, finished surfaces of visual display boards, including dirt, mold, and mildew.

3.3 INSTALLATION, GENERAL

- A. General: Install visual display surfaces in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.

3.4 INSTALLATION OF FACTORY-FABRICATED VISUAL DISPLAY BOARDS AND ASSEMBLIES

- A. Attach visual display boards to wall surfaces with egg-size adhesive gobs at 48 inches o.c., horizontally and vertically, per manufacturer's recommendations.
- B. Visual Display Boards: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display boards with fasteners at not more than 16 inches o.c. Secure both top and bottom of boards to walls.
 - 1. For larger board spans, in addition to the frame fastening.
 - 2. Field-Applied Aluminum Trim: Attach trim over edges of visual display boards and conceal grounds and clips. Attach trim to boards with fasteners at not more than 24 inches o.c.
 - a. Attach chalktrays to boards with fasteners at not more than 12 inches o.c.

3.5 CLEANING AND PROTECTION

- A. Clean visual display surfaces according to manufacturer's written instructions. Attach one cleaning label to visual display surface in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect visual display surfaces after installation and cleaning.

END OF SECTION

SECTION 101419

DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Dimensional characters.
 - a. Illuminated, fabricated channel dimensional characters.

1.2 DEFINITIONS

- A. Illuminated: Illuminated by lighting source integrally constructed as part of the sign unit.

1.3 COORDINATION

- A. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.4 SUBMITTALS

- A. Product Data: For each type of product.

B. Sustainable Design Submittals:

1. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

C. Shop Drawings: For signs.

1. Include fabrication and installation details and attachments to other work.
2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.
3. Show message list, typestyles, graphic elements, and layout for each sign.
4. Show locations of electrical service connections.
5. Include diagrams for power, signal, and control wiring.

- D. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Provide 4 inch x 4 inch sample of sheet metal with finish.

- E. Product Schedule: For dimensional letter signs. Use same designations indicated on Drawings or specified.

- F. Qualification Data: For Installer.
- G. Sample Warranty: For special warranty.
- H. Maintenance Data: For signs to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.6 FIELD CONDITIONS

- A. Field Measurements: Verify locations of electrical service embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.7 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Separation or delamination of sheet materials and components.
 - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: For exterior fabricated channel dimensional characters, allow for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- 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.

2.2 DIMENSIONAL CHARACTERS

- A. Fabricated Channel Characters: Metal face and side returns, formed free from warp and distortion; with uniform faces, sharp corners, and precisely formed lines and profiles; internally braced for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners; and as follows.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - a. A.R.K. Ramos.
 - b. ASI-Sign Systems Inc.
 - c. Gemini Incorporated.
 - d. Metallic Arts.
 2. Illuminated Characters: Backlighting character construction with LED lighting, including transformers, insulators, and other accessories for operability, with provision for servicing and concealing connections to building electrical system. Use tight or sealed joint construction to prevent unintentional light leakage. Space lamps apart from each other and away from character surfaces as needed to illuminate evenly.
 - a. Power: As indicated on electrical Drawings and as required for signage manufacturers LED system.
 - b. LEED Lighting Requirements: Signage lighting shall not exceed a luminance of 200 cd/m² to comply with LEED requirements. Provide dimming capabilities as required.
 - 1) LED Color: Warm White.
 - c. Weeps: Provide weep holes to drain water at lowest part of exterior characters. Equip weeps with permanent baffles to block light leakage without inhibiting drainage.
 3. Character Material: Sheet or plate aluminum.
 4. Material Thickness: Manufacturer's standard for size and design of character, but not less than 0.100 inch.
 5. Character Height: As indicated on Drawings.
 6. Character Depth: As indicated on Drawings.
 7. Finishes:
 - a. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, color Black.
 8. Mounting: Projecting studs.
 - a. Hold characters at manufacturer's recommended distance from wall surface as to allow the wall to be "washed" with light.
 9. Typeface: Avant Garde Medium.
- 2.3 DIMENSIONAL CHARACTER MATERIALS
- A. Aluminum Sheet and Plate: ASTM B209 (ASTM B209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- 2.4 ACCESSORIES
- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following:
 1. Use concealed fasteners and anchors unless indicated to be exposed.
 2. For exterior exposure, furnish stainless steel devices unless otherwise indicated.

3. Sign Mounting Fasteners:
 - a. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D1187/D1187M.

2.5 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
 1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 5. Internally brace dimensional characters for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
 6. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.

2.6 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.
- C. Apply finishes to formed metal after fabrication.

2.7 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

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.

- B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Verify that electrical service is correctly sized and located to accommodate signs.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF DIMENSIONAL CHARACTERS

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.
 - 1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 - 2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
 - 3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- B. Mounting Methods:
 - 1. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.
 - a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.
 - b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed characters and signs that do not comply with specified requirements. Replace characters with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 101423

PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Interior panel signs.
- 2. Vinyl-Character signs.

- B. Related Requirements:

- 1. Section 015000 "Temporary Facilities and Controls" for temporary Project identification signs and for temporary informational and directional signs.
- 2. Section 142100 "Electric Traction Elevators" for code-required conveying equipment signage.
- 3. Division 22 sections for "Identification for Plumbing Piping and Equipment" for labels, tags, and nameplates for plumbing systems and equipment.
- 4. Division 23 sections for "Identification for HVAC Piping and Equipment" for labels, tags, and nameplates for HVAC systems and equipment.
- 5. Division 26 sections for "Identification for Electrical Systems" for labels, tags, and nameplates for electrical equipment.
- 6. Division 26 sections for "Emergency and Exit Lighting" for illuminated, self-luminous, and photoluminescent exit sign units.

1.3 DEFINITIONS

- A. Accessible: In accordance with the accessibility standard.

1.4 SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings: For panel signs.
 - 1. Include fabrication and installation details and attachments to other work.
 - 2. Show sign mounting heights, locations of supplementary supports to be provided by other installers, and accessories.

3. Show message list, tpestyles, graphic elements, including raised characters and Braille, and layout for each sign.
- D. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.
 1. Include representative Samples of available tpestyles and graphic symbols.
- E. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:
 1. Panel Signs:
 - a. Full-size Sample of typical Room sign.
- F. Product Schedule: For panel signs. Use same designations indicated on Drawings or specified.
- G. Sample Warranty: For special warranty.
- H. Maintenance Data: For signs to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. 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. Fabricator must have sufficient capacity to produce required amount of sign units without causing delay in work.
- C. Source Limitations for Signs: Unless indicated otherwise, obtain panel signage indicated from one source from a single manufacturer.

1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Deterioration of finishes beyond normal weathering.
 - b. Deterioration of embedded graphic image.
 - c. Separation or delamination of sheet materials and components.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design" and ICC A117.1.

2.2 PANEL SIGNS

- A. Panel Signs: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

- 1. Manufacturers: Subject to compliance with requirements, provide the product indicated on Drawings or a comparable product by one of the following:

- a. ASI-Modulex, Inc.
- b. Ellet Sign Company.
- c. Innerface Sign Systems, Inc.
- d. Interior Graphics IGI.

- 2. Laminated-Sheet Sign (Inlaid Type): Acrylic face sheet with CNC cutout voids for graphics and braille laminated to acrylic backing sheet, over subsurface graphics, to produce composite sheet.

- a. Typical Sign: 0.060 (1/16) inch clear acrylic face sheet laminated to 0.125 (1/8) inch acrylic back sheet.

- 1) Back sheet to be painted on its second (wall side) surface.

- b. Window Sign: 0.060 (1/16) inch clear acrylic face sheet laminated to 0.030 (1/32) inch black acrylic middle sheet laminated to 0.125 (1/8) inch clear acrylic back sheet.

- 1) Gap created with middle sheet for window for slide-in changeable paper inserts.
- 2) Back sheet to be painted on its second (wall side) surface.

- c. Surface-Applied, Raised Graphics: Text and symbols to be CNC cut from 0.125 (1/8) inch solid colored acrylic sheet and chemically welded, through cutout voids in the face sheet, to the middle sheet (window sign) or back sheet (typical sign).

- d. Braille Dots: 0.0625-inch clear UV stable acrylic spheres embedded and adhered to sign face surface.

- e. Subsurface Graphics (Non-ADA): Reverse image painted on back (number 2 surface) of face sheet.

- f. Color Coatings: Paint applied to back (number 2 surface) of face sheet.

- 3. Sign-Panel Perimeter: Finish edges smooth.

- a. Edge Condition: Square cut.
- b. Corner Condition in Elevation: Square.

- 4. Frame: Entire perimeter.

- a. Material: Aluminum.
- b. Material Thickness: 0.0625 (1/16) inches.

- c. Frame Profile: Angle 0.50 (1/2)-inch-deep with 0.125 (1/8) inch backing plate.
 - d. Profile: Square.
 - e. Corner Condition in Elevation: Square.
 - f. Finish and Color: Painted, matte black color.
 - g. Frame Mounting: Surface mount aluminum back plate/bracket to wall with concealed anchors.
5. Signage Mounting: Surface mounted to wall and glass with two-face tape.
- a. Surface mounted to aluminum frame bracket with two face tape magnetic tape.
6. Surface Finish and Applied Graphics:
- a. Integral Acrylic Sheet Color: As indicated by manufacturer's designation.
 - b. Painted Finish and Graphics: Manufacturer's standard, factory-applied acrylic polyurethane in color as indicated by manufacturer's designation.
 - c. Baked-Enamel or Powder-Coat Finish (Metal Frames): Manufacturer's standard, in color as indicated by manufacturer's designation.
 - d. Photo-Image Graphics: Manufacturer's standard multicolor halftone or dot-screen image.
7. Text and Typeface: Accessible raised characters and Braille, typeface as indicated by manufacturer's designation and variable content as scheduled.
- a. Finish raised characters to contrast with background color, and finish Braille to match background color.
8. Flatness Tolerance: Sign shall remain flat or uniformly curved under installed conditions as indicated on Drawings and within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner.

2.3 FIELD- APPLIED, VINYL-CHARACTER SIGNS

- A. Field-Applied, Vinyl-Character Sign: Prespaced characters die cut from 3- to 3.5-mil thick, weather-resistant vinyl film with release liner on the back and carrier film on the front for on-site alignment and application.
1. Manufacturers: Subject to compliance with requirements, provide product indicated or comparable product by one of the following:
 - a. 3M
 - b. Oracal
 2. Fabricator and Installers: Subject to compliance with requirements select one the following or comparable fabricator and installers:
 - a. ASI-Modulex, Inc.
 - b. Ellet Sign Company.
 - c. Innerface Sign Systems, Inc.
 - d. Interior Graphics IGI.

3. Size, Color and Locations:
 - a. As indicated on Drawings 12- and 16-inch red letters.
 - 1) Maker Space Entry
 - 2) Big Red Store Entry
 - b. As indicated on Drawings 6-inch black letters.
 - 1) 3D Fabrication
 - 2) Makerspace
 - c. As indicated on Drawings 6-inch white letters.
 - 1) Global Logistics Entry
 - 2) Innovation, Science & Technology Entry
 - 3) Bio Med Entry
 - 4) Clean Energy Entry
 - 5) Aeronautics Entry
 - 6) Multimedia Entry
 - 7) Science Entry
 - 8) Health Informatics
4. Substrate: As indicated on Drawings.
5. Text and Font: As indicated on Drawings and/or to be selected by owner to match new building standards.

2.4 PANEL-SIGN MATERIALS

- A. Aluminum Sheet and Plate: ASTM B209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- B. Aluminum Extrusions: ASTM B221, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated.
- C. Acrylic Sheet: ASTM D4802, category as standard with manufacturer for each sign, Type UVF (UV filtering).
- D. Paints and Coatings for Acrylic Sheet Materials: Paints that are recommended by manufacturer for optimum adherence to acrylic surface and are UV and water resistant for colors and exposure indicated.

2.5 ACCESSORIES

- A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signs, noncorrosive and compatible with each material joined, and complying with the following unless otherwise indicated:
 1. Use concealed fasteners and anchors unless indicated to be exposed.
- B. 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 signs with imposed loads to structure.
 2. Type: Torque-controlled expansion anchor, torque-controlled adhesive anchor or adhesive anchor.
 3. Material for Interior Locations: Carbon-steel components zinc-plated to comply with ASTM B633 or ASTM F1941 (ASTM F1941M), Class Fe/Zn 5, unless otherwise indicated.
 4. Material for Exterior or Interior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F593 (ASTM F738M), and nuts, ASTM F594 (ASTM F836M).
- C. Power-Actuated Anchors: Fastener systems 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 AC70.
- D. Adhesive: As recommended by sign manufacturer.
- E. Two-Face Tape: Manufacturer's standard high-bond, foam-core tape, 0.045-inch-thick, with adhesive on both sides.

2.6 FABRICATION

- A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
1. Preassemble signs in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
 2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
 3. Comply with AWS for recommended practices in welding and brazing. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
 4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
 5. Internally brace signs for stability, to meet structural performance loading without oil-canning or other surface deformation, and for securing fasteners.
 6. Provide rabbets, lugs, and tabs necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
- B. Surface-Cut Graphics (Inlaid Type Signage): CMC cut text character shapes and other graphic image shapes completely through face sheet to produce precisely formed outline of raised ADA text and images.
1. CNC cut text and images to be placed in outline voids and chemically adhered/welded to sheet that face sheet is laminated to.
- C. Subsurface-Applied Graphics: Apply graphics to back face of clear face-sheet material to produce precisely formed image. Image shall be free of rough edges.
- D. Subsurface-Engraved Graphics: Reverse engrave back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's background color coating over enamel-filled copy.
- E. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:

1. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function. Furnish initial changeable insert. Subsequent changeable inserts are by Owner.
 2. For frame to hold changeable sign panel, fabricate frame without burrs or constrictions that inhibit function. Furnish initial sign panel. Subsequent changeable sign panels are by Owner.
- F. Brackets and Frames: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.
1. Aluminum Brackets: Factory finish brackets with baked-enamel or powder-coat finish as indicated.

2.7 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.
- C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.
- D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

2.8 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

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. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
 2. Install signs so they do not protrude or obstruct according to the accessibility standard.
 3. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.
- B. Accessible Signage: Install in locations on walls as indicated on Drawings and according to the accessibility standard.
- C. Mounting Methods:
1. Two-Face Tape: Clean bond-breaking materials from substrate surface and remove loose debris. Apply tape strips symmetrically to back of sign and of suitable quantity to support weight of sign without slippage. Keep strips away from edges to prevent visibility at sign edges. Place sign into position and push to engage tape adhesive.
 2. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign into position and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.
 3. Mounting Plates (with Metal Framing): Provide 1/8-inch-thick, concealed aluminum mounting plates with predrilled and countersunk holes, at locations indicated, and where other direct mounting methods are impractical. Attach plate with fasteners and anchors suitable for secure attachment to substrate. Attach signs to plate using method specified above.
- D. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish. Place onto the opposite side of glass to conceal back of sign.

3.3 ADJUSTING AND CLEANING

- A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.
- B. Remove temporary protective coverings and strippable films as signs are installed.
- C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION

SECTION 102113.19

PLASTIC TOILET COMPARTMENTS

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 solid-plastic toilet compartments configured as toilet enclosures and urinal screens.
- B. Related Requirements:
 - 1. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings: For toilet compartments.
 - 1. Include plans, elevations, sections, details, and attachment details.
 - 2. Show locations of cutouts for compartment-mounted toilet accessories.
 - 3. Show locations of centerlines of toilet fixtures.
 - 4. Show ceiling grid and overhead support or bracing locations when applicable.
- D. Samples for Verification: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - 1. Each type of material, color, and finish required for toilet compartments, prepared on minimum 2-inch square Samples of same thickness and material indicated for Work.
- E. Product Schedule: For toilet compartments, prepared by or under the supervision of supplier, detailing location and selected colors for toilet compartment material.
- F. Maintenance Data: For toilet compartments to include in maintenance manuals.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

1.5 WARRANTY

- A. Special Manufacturer's Warranty: Provide manufacturer's standard form in which manufacturer agrees to repair or replace products that fail during the following period after substantial completion:
 - 1. Plastic Toilet Partitions: Against any failures including breakage, corrosion or delamination: 15 years.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Flame-Spread Index: 200 or less.
 - 2. Smoke-Developed Index: 450 or less.
- A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1 for toilet compartments designated as accessible.

2.2 SOLID-PLASTIC TOILET COMPARTMENTS

- A. Manufacturers: Subject to compliance with requirements, 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:
 - 1. Accurate Partitions Corporation; ASI Group.
 - 2. Bradley Corporation; Mills Partitions.
 - 3. General Partitions Mfg. Corp.
 - 4. Global Partitions; ASI Group.
 - 5. Scranton Products.
- B. Toilet-Enclosure Style: Overhead braced.
- C. Urinal-Screen Style: Wall hung, flat panel with continuous bracket.
- D. Door, Panel and Pilaster Construction: Solid, high-density polyethylene (HDPE) panel material, not less than 1 inch thick, seamless, with eased edges, no-sightline system, and with homogenous color and pattern throughout thickness of material.
 - 1. Integral Hinges: Configure doors and pilasters to receive integral hinges.
 - 2. Heat-Sink Strip: Manufacturer's standard continuous, extruded-aluminum strip fastened to exposed bottom edges of solid-plastic components to hinder malicious combustion.

3. Color and Pattern: One color and pattern in each room as indicated by manufacturer's designations.
- E. Pilaster Shoes and Sleeves (Caps): Manufacturer's standard design; stainless steel.
- F. Brackets (Fittings):
 1. Stirrup Type: Ear or U-brackets; stainless steel.
 - a. To be used only where continuous brackets cannot be used due to wall finishes not being in the same plane.
 2. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

2.3 HARDWARE AND ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.
 1. Material: Stainless steel.
 1. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees allowing emergency access by lifting door.
 2. Latch and Keeper: Manufacturer's standard recessed latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 3. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 4. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 5. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with anti-grip profile and in manufacturer's standard finish.
 1. Headrail clamps to pilasters and is secured to walls with stainless steel brackets.
- C. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel compatible with related materials.

2.4 MATERIALS

- A. Aluminum Castings: ASTM B26/B26M.
- B. Aluminum Extrusions: ASTM B221 (ASTM B221M).
- C. Brass Castings: ASTM B584.
- D. Brass Extrusions: ASTM B455.
- E. Stainless-Steel Sheet: ASTM A666, Type 304, stretcher-leveled standard of flatness.

- F. Stainless-Steel Castings: ASTM A743/A743M.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch- wide, in-swinging doors for standard toilet compartments and 36-inch- wide, out-swinging doors with a minimum 32-inch- wide, clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch.
 - b. Panels and Walls: 1 inch.
 - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.
 - a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
 - c. Stirrup Brackets are to be used only where continuous brackets cannot be used due to wall finishes not being in the same plane.
 - 3. Full-Height (Continuous) Brackets: Secure panels to walls and to pilasters with full-height brackets.
 - a. Locate bracket fasteners so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.

- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than 1-3/4 inches into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION

SECTION 102600
WALL PROTECTION

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. Corner guards.
- 2. Abuse resistant wall coverings.

- B. Related Requirements:

- 1. Section 061053 "Miscellaneous Rough Carpentry" for wood blocking required for installing wall protection.
- 2. Section 092216 "Non-Structural Metal Framing" for steel sheet blocking required for installing wall protection.

1.3 SUBMITTALS

- A. Product Data: For each type of product.

- 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.

- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.

- C. Shop Drawings: For each type of wall protection showing locations and extent.

- 1. Include plans, elevations, sections, and attachment details.

- D. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples of size indicated below:

- 1. Minimum 2 inches by 4 inches square by specified thickness.
- 2. Abuse resistant wall coverings: 12 inches long. Include examples of corners and finished factory edges.

- E. Sample Warranty: For special warranty.

- F. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.

1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.
 1. Maintain room temperature within storage area at not less than 70 deg F during the period plastic materials are stored.
 2. Keep plastic materials out of direct sunlight.
 3. Store plastic wall- and door-protection components for a minimum of 72 hours, or until plastic material attains a minimum room temperature of 70 deg F.
 - a. Store corner-guard covers in a vertical position.
 - b. Store wall-guard, handrail and other covers in a horizontal position.

1.5 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of wall- and door-protection units that fail in materials or workmanship within specified warranty period.
 1. Failures include, but are not limited to, the following:
 - a. Structural failures including detachment of components from each other or from the substrates, delamination, and permanent deformation beyond normal use.
 - b. Deterioration of metals, metal finishes, plastics, and other materials beyond normal use.
 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall protection products of each type from single source from single manufacturer.
- B. Basis of Design: Subject to compliance with requirements, provide products by Diamond Life, or products by one of the following:
 1. IPC Door and Wall Protection Systems; Division of InPro Corporation.
 2. Construction Specialties, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E84 or UL 723; 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.

- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1.

2.3 CORNER GUARDS

- A. Surface-Mounted, Metal Corner Guards CG-1: Fabricated as one piece from formed metal with formed edges; with 90- degree wall condition or factory formed for 45 to 178- degree turn to match wall condition.

1. Model: Diamond Life, Corner Protector MX
2. Material: Stainless-steel sheet, Type 304.
 - a. Thickness: Minimum 0.0500 inch.
 - b. Finish: Brushed stainless steel.
3. Wing Size: Nominal: 2 by 2 inches.
4. Corner Radius: Maximum of 3/16 inch.
5. Edge: Straight
6. Mounting: Adhesive.

2.4 ABUSE-RESISTANT WALL COVERINGS

- A. Abuse-Resistant Sheet Wall Covering (WP-1): Fabricated from semirigid, plastic sheet wall-covering material.

1. Model: Diamond Life, Colored Aluminum Sheet
2. Size: Factory cut and bent panels with factory finished edges as indicated on drawings.
3. Sheet Thickness: 0.040 inch
4. Color and Texture: Red and smooth.
5. Height: As indicated on drawings.
6. Trim and Joint Moldings: Install with no moldings, provide matching sealant at exposed factory finished edges.
7. Mounting: Adhesive.

2.5 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required; thickness as indicated.
- B. Polycarbonate Plastic Sheet: ASTM D6098, S-PC01, Class 1 or Class 2, abrasion resistant; with a minimum impact-resistance rating of 15 ft.-lbf/in. of notch when tested according to ASTM D256, Test Method A.
- C. Solid Wood: Clear hardwood lumber of species indicated, free of appearance defects, and selected for compatible grain and color.

- D. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
- E. Adhesive: As recommended by protection product manufacturer.

2.6 FABRICATION

- A. Fabricate wall protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
- B. Factory Assembly: Assemble components in factory to greatest extent possible to minimize field assembly. Disassemble only as necessary for shipping and handling.
- C. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

2.7 FINISHES

- A. Protect 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine walls to which wall protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
 - 1. For wall protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing wall and door protection.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

3.3 INSTALLATION

- A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Mounting Heights: Install wall and door protection in locations and at mounting heights indicated on Drawings.
- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
 - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
 - 2. Where splices occur in horizontal runs of more than 20 feet, splice aluminum retainers and plastic covers at different locations along the run, but no closer than 12 inches apart.
 - 3. Adjust end and top caps as required to ensure tight seams.
- D. Abuse-Resistant Wall Covering:
 - 1. Utilize factory cut panel sheet lengths to cover outside corners as indicated on drawings. Minimize splice joints.

3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION

SECTION 102800

TOILET, BATH, AND LAUNDRY 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. This Section includes the following:

- 1. Public-use washroom accessories.
- 2. Under lavatory guards.
- 3. Custodial accessories.

- B. Related Sections include the following:

- 1. Section 061053 "Miscellaneous Rough Carpentry" for wood blocking required for installing accessories.
- 2. Section 092216 "Non-Structural Metal Framing" for steel sheet blocking required for installing accessories.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:

- 1. Construction details and dimensions.
- 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- 3. Material and finish descriptions.
- 4. Features that will be included for Project.
- 5. Manufacturer's warranty.

- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

- 1. Identify locations using room designations indicated on Drawings.
- 2. Identify products using designations indicated on Drawings.

- C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same articles in Part 2, provide products of same manufacturer unless otherwise approved by Architect.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

1.6 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Brass: ASTM B 19 flat products; ASTM B 16, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.0359-inch minimum nominal thickness.
- D. Galvanized Steel Sheet: ASTM A 653/A 653M, with G60 hot-dip zinc coating.
- E. Galvanized Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- H. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product by Bobrick Washroom Equipment, Inc. or a comparable product by one of the following:
 - 1. American Specialties, Inc.
 - 2. Bradley Corporation.
- B. Toilet Tissue (Roll) Dispenser TPD-1:

1. Basis-of-Design Product: Bobrick B-2888.
2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
3. Mounting: Surface mounted.
4. Operation: Noncontrol delivery with theft-resistant spindle.
5. Capacity: Designed for 5-inch diameter tissue rolls.
6. Material and Finish: Stainless steel, No. 4 finish (satin).

C. Paper Towel (Folded) Dispenser TD-1:

1. Basis-of-Design Product: Bobrick 3944-52.
2. Mounting: Surface mounted.
3. Minimum Capacity: 400 C-fold or 525 multifold towels.
4. Material and Finish: Stainless steel, No. 4 finish (satin).
5. Lockset: Tumbler type.
6. Refill Indicators: Pierced slots at sides or front.

D. Combination Towel (Folded) Dispenser/Waste Receptacle WR-1:

1. Basis-of-Design Product: Bobrick B-3699.
2. Description: Combination unit for dispensing C-fold or multifold towels, with removable waste receptacle.
3. Mounting: Recessed with projecting receptacle.
 - a. Designed for nominal 4-inch wall depth.
4. Minimum Towel-Dispenser Capacity: 350 C-fold or 475 multifold paper towels.
5. Minimum Waste-Receptacle Capacity: 2 gal.
6. Material and Finish: Stainless steel, No. 4 finish (satin).
7. Lockset: Tumbler type for towel-dispenser compartment and waste receptacle.

E. Liquid Soap Dispenser SD-1:

1. Basis-of-Design Product: Bobrick B-2111.
2. Description: Combination unit for dispensing soap in liquid or lotion form.
3. Mounting: Vertically oriented, surface mounted.
4. Capacity: 40 fl. oz.
5. Materials: Stainless steel, No. 4 finish (satin) body with black molded plastic push button spout and valve.
6. Lockset: Tumbler type.
7. Refill Indicator: Window type.

F. Grab Bar :

1. Basis-of-Design Product: Bobrick B-5806 .99.
2. Mounting: Flanges with concealed fasteners.
3. Material: Stainless steel, 0.05 inch thick.
 - a. Finish: Smooth, No. 4, satin finish on ends and slip-resistant texture in grip area].
4. Outside Diameter: 1-1/4 inches.
5. Configuration and Length:
 - a. GB-36" B-5806.99 x 36
 - b. GB-42" B-5806.99 x 42

- c. GB-18" B-5806.99 x 18
- d. GB-24" B-5806.99 x 24

G. Sanitary-Napkin Disposal Unit SND-1:

- 1. Basis-of-Design Product: Bobrick – 254.
- 2. Mounting: Surface mounted.
- 3. Door or Cover: Self-closing disposal-opening cover and hinged face panel with tumbler lockset.
- 4. Receptacle: Removable.
- 5. Material and Finish: Stainless steel, No. 4 finish (satin).

H. Mirror Unit:

- 1. Basis-of-Design Product: Bobrick B-290 Series with tempered glass.
- 2. Frame: Stainless-steel angle, 0.05 inch thick.
 - a. Corners: Welded and ground smooth.
- 3. Hangers: Produce rigid, tamper- and theft-resistant installation, using method indicated below.
 - a. Wall bracket of galvanized steel, equipped with concealed locking devices requiring a special tool to remove.
- 4. Size: As indicated on Drawings.

2.3 UNDERLAVATORY GUARDS

A. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product by Truebro, Inc. or a comparable product by one of the following:

- 1. Plumberex Specialty Products, Inc.
- 2. TCI Products.

B. Underlavatory Guard LG-1:

- 1. Basis-of-Design Product: Truebro Low-Shield.
- 2. Description: Molded plastic covering for supply and drain piping assemblies that prevent direct contact with piping.
- 3. Material and Finish: Molded-vinyl, white.

C. Underlavatory Guard LG-2:

- 1. Basis of Design Product: Truebro Lav-Guard.
- 2. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping, and allow service access without removing coverings.
- 3. Material and Finish: Antimicrobial, molded-plastic, white.

2.4 CUSTODIAL ACCESSORIES

- A. Basis-of-Design Product: The design for accessories is based on products indicated. Subject to compliance with requirements, provide the named product by Bobrick Washroom Equipment, Inc. or a comparable product by one of the following:
 - 1. American Specialties, Inc.
 - 2. Bradley Corporation.

- B. Mop and Broom Holder MH-1:
 - 1. Basis-of-Design Product: Bobrick B-224.
 - 2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf].
 - 3. Length: 36 inches.
 - 4. Hooks: Three.
 - 5. Mop/Broom Holders: Four, spring-loaded, rubber hat, cam type.
 - 6. Material and Finish: Stainless steel, No. 4 finish (satin).
 - a. Shelf: Not less than nominal 0.05-inch- thick stainless steel.
 - b. Rod: Approximately 1/4-inch- diameter stainless steel.

2.5 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.

- B. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six keys to Owner's representative.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.

- B. Grab Bars: Install to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.

- B. Remove temporary labels and protective coatings.

- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION

SECTION 104100

EMERGENCY ACCESS CABINETS

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. Emergency key lock box.

1.3 SUBMITTALS

- A. Product Data: For each type of unit.
- B. Manufacturers installation instructions.
- C. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- D. Shop Drawings: Include methods of installation that differ from manufacturers standard details. Indicate dimensions, clearances and depth of recess.

1.4 QUALITY ASSURANCE

- A. Authority Having Jurisdiction (AHJ): Verify at the time of obtaining and installing lock boxes, that the unit included in this section is the model required by the Steubenville Fire Department.
 - 1. Coordinate installation locations with both the AHJ and the Owner.
 - 2. Coordinate including the building master key(s) and any other keys with both the AHJ and the Owner.

1.5 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

1.6 WARRANTY

- A. Special Warranty: To the Original User, manufacturer agrees to repair or replace mechanical components which fail in materials or workmanship within specified warranty period.

1. Warranty Period: Life time warranty for the Original Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fixed louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 EMERGENCY KEY LOCK BOX

- A. Product: Provide Knox Box 3200 by Knox Company.
 1. Provide recess mounting kit, 1/4 inch thick case walls, all welded.
 2. Box Size: 4 inches high by 5 inches wide by 3-7/8 inches deep.
 - a. Recess mounting flange 7 by 7 inches.
 3. Solid steel door, 1/2 inch thick with continuous interior gasket.
 4. Stainless steel door hinge and lock cover.
 5. Lock:
 - a. Double acting rotating tumblers with hardened steel pins.
 - b. Biased cut keys.
 6. Manufacturers standard Knox-Coat finish.
 - a. Color – Black.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and openings, 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. Coordinate setting drawings, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.
 1. Locations and mounting heights are to be those coordinated and approved by the Steubenville Fire Department.

3.3 INSTALLATION

- A. Locate and place lock boxes level, plumb, and at indicated alignment with adjacent work.
- B. Install in accordance with manufacturer's instructions.
- C. Protect unpainted galvanized- and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

3.4 ADJUSTING AND CLEANING

- A. Clean exposed lock box surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.

END OF SECTION

SECTION 104413

FIRE PROTECTION CABINETS

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. Fire-protection cabinets for the following:
 - a. Portable fire extinguishers.

- B. Related Requirements:

- 1. Section 104416 "Fire Extinguishers" for portable, hand-carried fire extinguishers accommodated by fire-protection cabinets.

1.3 PREINSTALLATION CONFERENCE

- A. Preinstallation Conference: Conduct conference at Project site.

- 1. Review methods and procedures related to fire-protection cabinets, including, but not limited to, the following:
 - a. Schedules and coordination requirements.

1.4 SUBMITTALS

- A. Product Data: For each type of product.

- 1. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
- 2. Show location of knockouts for hose valves.

- B. Shop Drawings: For fire-protection cabinets.

- 1. Include plans, elevations, sections, details, and attachments to other work.

- C. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

1.6 COORDINATION

- A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain fire-protection cabinets, accessories, and fire extinguishers from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E814 for fire-resistance rating of walls where they are installed.

2.3 FIRE-EXTINGUISHER CABINETS

- A. Fire-Extinguisher Cabinets: Suitable for type, size and capacity of fire extinguishers indicated.
 - 1. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products by Larsen's Manufacturing Company or comparable products by one of the following:
 - a. Badger Fire Protection.
 - b. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - c. Kidde Residential and Commercial Division
- B. Fire Extinguisher Cabinet Type 1 (FEC -1):
 - 1. Larsen's Model No. AL 2409-6R.
 - 2. Cabinet Construction: Nonrated.
 - 3. Cabinet Material: Cold-rolled steel sheet.
 - 4. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface, with exposed trim face and wall return at outer edge (backbend).
 - a. Rolled- Edge Trim: 2-1/2-inch backbend depth.
 - 5. Cabinet Trim Material: Extruded-aluminum shapes.
 - 6. Door Material: Extruded-aluminum shapes or aluminum sheet.
 - 7. Door Style: Vertical duo panel with frame.
 - 8. Door Glazing: Tempered float glass (clear).
 - 9. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

- a. Projecting door pull and friction latch.
- b. Provide Continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

C. 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. Locate as indicated.
 - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER".
 - 1) Location: Applied to cabinet door.
 - 2) Application Process: Pressure-sensitive vinyl letters.
 - 3) Lettering Color: Red.
 - 4) Orientation: Vertical.

D. Materials:

1. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.
 - a. Finish: Baked enamel, TGIC polyester powder coat, HAA polyester powder coat, epoxy powder coat, or polyester/epoxy hybrid powder coat, complying with AAMA 2603.
 - b. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - c. Color: White.
2. Aluminum: ASTM B221 (ASTM B221M) for extruded shapes and aluminum sheet, with strength and durability characteristics of not less than Alloy 6063-T5 for aluminum sheet.
 - a. Finish: Clear anodic.
3. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

2.4 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. Miter corners and grind smooth.
 3. 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.
 1. Fabricate door frames with extruded tubular stiles and rails and hollow-metal design, minimum 1/2 inch thick.
 2. Miter and weld perimeter door frames and grind smooth.

- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's AMP 500, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire-protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. 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.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare recesses for 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 or, if not indicated, at height indicated below:
 - 1. Fire-Protection Cabinets: 54 inches above finished floor to top of fire extinguisher.
- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
 - 1. Unless otherwise indicated, provide semi-recessed fire-protection cabinets.
 - 2. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- C. Identification:
 - 1. Apply vinyl lettering at locations indicated.

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. Verify that integral locking devices operate properly.
- 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

SECTION 104416
FIRE EXTINGUISHERS

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 portable, hand carried fire extinguishers and mounting brackets for fire extinguishers.
- B. Related Sections:
 - 1. Section 104413 "Fire Extinguisher Cabinets."

1.3 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.
- B. Product Schedule: For fire extinguishers. Coordinate final fire-extinguisher schedule with fire-protection cabinet schedule to ensure proper fit and function. Use same designations indicated on Drawings.
- C. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.
- D. Warranty: Sample of special warranty.

1.4 COORDINATION

- A. Coordinate type and capacity of fire extinguishers with fire protection cabinets to ensure fit and function.

1.5 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure of hydrostatic test according to NFPA 10 when testing interval required by NFPA 10 is within the warranty period.

- b. Faulty operation of valves or release levers.
2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
 1. Provide fire extinguishers approved, listed, and labeled by FM Global.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

- A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet fire protection cabinet and mounting bracket indicated.
 1. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products by Larsen's Manufacturing Company or comparable products by one of the following:
 - a. Badger Fire Protection.
 - b. J. L. Industries, Inc.; a division of Activar Construction Products Group.
 - c. Kidde Residential and Commercial Division
 2. Fire Extinguisher Type 1 (FE-1):
 - a. Larsen's Model No. MP5.
 - 1) Valves: Manufacturer's standard.
 - 2) Handles and Levers: Manufacturer's standard.
 - 3) Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
 - b. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 2-A:10-B:C, 5-lb nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.
 - 1) Finish Color: Red.
 3. Fire Extinguisher Type 2 (FE-2):
 - a. Larsen's Model No. WC6L.
 - 1) Valves: Manufacturer's standard.
 - 2) Handles and Levers: Stainless Steel.
 - 3) Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

- b. Wet-Chemical Type: UL-rated 2-A: 1-B:C: K, 1.6 gal. (6-L) nominal capacity, with potassium acetate-based chemical in stainless-steel container; with pressure-indicating gage.
 - 1) Finish: Polished stainless steel.

2.3 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

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.
 - 1. Mounting Brackets: 54 inches above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION

SECTION 105113
METAL LOCKERS

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. Knocked-down corridor lockers.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.

1.4 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 metal locker.
- B. Sustainable Design (LEED) Submittals: Refer to Section 018113.14 and comply with requirements when applicable.
- C. Shop Drawings: For metal lockers.
 - 1. Include plans, elevations, sections, and attachment details.
 - 2. Show locker trim and accessories.
 - 3. Include locker identification system and numbering sequence.
- D. Samples: For each color specified, in manufacturer's standard size.
- E. Product Schedule: For lockers. Use same designations indicated on Drawings.
- F. Qualification Data: For Installer.
- G. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms 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. The following metal locker hardware items equal to 10 percent of amount installed for each type and finish installed, but no fewer than five units:
 - a. Locks.
 - b. Blank identification plates.
 - c. Hooks.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver metal lockers until spaces to receive them are clean, dry, and ready for their installation.

1.8 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of recessed openings by field measurements before fabrication.

1.9 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that metal lockers can be supported and installed as indicated.

1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of metal lockers that fail in materials or workmanship, excluding finish, within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures.
 - b. Faulty operation of latches and other door hardware.
 - 2. Damage from deliberate destruction and vandalism is excluded.
 - 3. Warranty Period for Knocked-Down Metal Lockers: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain metal lockers and accessories from single source from single locker manufacturer.
1. Obtain locks from single lock manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Accessibility Standard: For lockers indicated to be accessible, comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design", the Ohio Building Code 2017 and the amended sections of the ICC A117.1 in the OBC.

2.3 KNOCKED-DOWN CORRIDOR LOCKERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Republic Storage Systems Company; Quiet Lockers or comparable product by one of the following:
1. Art Metal Products.
 2. General Storage Systems Ltd.
 3. Lyon Workspace Products, LLC.
 4. Penco Products, Inc.
- B. Doors: One piece; fabricated from 0.060-inch nominal-thickness steel sheet; formed into channel shape with double bend at vertical edges and with right-angle single bend at horizontal edges.
1. Doors less than 12 inches wide may be fabricated from 0.048-inch nominal-thickness steel sheet.
 2. Doors for box lockers less than 15 inches wide may be fabricated from 0.048-inch nominal-thickness steel sheet.
 3. Reinforcement: Manufacturer's standard reinforcing angles, channels, or stiffeners for doors more than 15 inches wide; welded to inner face of doors.
 4. Stiffeners: Manufacturer's standard full-height stiffener fabricated from 0.048-inch nominal-thickness steel sheet; welded to inner face of doors.
 5. Sound-Dampening Panels: Manufacturer's standard, designed to stiffen doors and reduce sound levels when doors are closed, of die-formed metal with full perimeter flange and sound-dampening material; welded to inner face of doors.
 6. Door Style: Unperforated panel.:
 - a. Concealed Vents: Slotted perforations in top and bottom horizontal door return flanges.
- C. Body: Assembled by riveting or bolting body components together. Fabricate from unperforated steel sheet with thicknesses as follows:
1. Tops, Bottoms, and Intermediate Dividers: 0.024-inch nominal thickness, with single bend at sides.
 2. Backs and Sides: 0.024-inch nominal thickness, with full-height, double-flanged connections.
 3. Shelves: 0.024-inch nominal thickness, with double bend at front and single bend at sides and back.

- D. Frames: Channel formed; fabricated from 0.060-inch nominal-thickness steel sheet; lapped and factory welded at corners; with top and bottom main frames factory welded into vertical main frames. Form continuous, integral, full-height door strikes on vertical main frames.
 - 1. Cross Frames between Tiers: Channel formed and fabricated from same material as main frames; welded to vertical main frames.
 - 2. Frame Vents: Fabricate face frames with vents.
- E. Hinges: Welded to door and attached to door frame with no fewer than two factory-installed rivets per hinge that are completely concealed and tamper resistant when door is closed; fabricated to swing 180 degrees.
 - 1. Knuckle Hinges: Steel, full loop, five or seven knuckles, tight pin; minimum 2 inches high. Provide no fewer than three hinges for each door more than 42 inches high.
- F. Recessed Door Handle and Latch: Stainless-steel cup with integral door pull, recessed so locking device does not protrude beyond door face; pry and vandal resistant.
 - 1. Multipoint Latching: Finger-lift latch control designed for use with built-in combination locks, built-in key locks, or padlocks; positive automatic latching and prelocking.
 - a. Latch Hooks: Equip doors 48 inches and higher with three latch hooks and doors less than 48 inches high with two latch hooks; fabricated from 0.105-inch nominal-thickness steel sheet; welded or riveted to full-height door strikes; with resilient silencer on each latch hook.
 - b. Latching Mechanism: Manufacturer's standard, rattle-free latching mechanism and moving components isolated to prevent metal-to-metal contact and incorporating a prelocking device that allows locker door to be locked while door is open and then closed without unlocking or damaging lock or latching mechanism.
- G. Door Handle and Latch for Box Lockers: Stainless-steel strike plate with integral pull; with steel padlock loop that projects through metal locker door.
- H. Locks: Combination padlocks provided by Owner.
- I. Identification Plates: Manufacturer's standard, etched, embossed, or stamped aluminum plates, with numbers and letters at least 3/8 inch high.
- J. Hooks: Manufacturer's standard ball-pointed hooks, aluminum or steel; zinc plated.
- K. Coat Rods: Manufacturer's standard.
- L. Coat Rods: 1-inch- diameter steel tube or rod, chrome finished.
- M. Continuous Zee Base: Fabricated from manufacturer's standard thickness, but not less than 0.060-inch nominal-thickness steel sheet.
 - 1. Height: 4 inches.
- N. Continuous Sloping Tops: Fabricated from manufacturer's standard thickness, but not less than 0.036-inch nominal-thickness steel sheet.
 - 1. Closures: Hipped-end type.
 - 2. Sloping-top corner fillers, mitered.

- O. Recess Trim: Fabricated from 0.048-inch nominal-thickness steel sheet.
- P. Filler Panels: Fabricated from 0.036-inch nominal-thickness steel sheet.
- Q. Finished End Panels: Fabricated from 0.024-inch nominal-thickness steel sheet to cover unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
- R. Materials:
 - 1. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
- S. Finish: Baked enamel.
 - 1. Color: As selected by Architect from manufacturer's full range.

2.4 LOCKS

- A. Combination Padlock: Provided by Owner.

2.5 FABRICATION

- A. Fabricate metal lockers square, rigid, without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges safe to touch and free of sharp edges and burrs.
 - 1. Form body panels, doors, shelves, and accessories from one-piece steel sheet unless otherwise indicated.
 - 2. Provide fasteners, filler plates, supports, clips, and closures as required for complete installation.
- B. Fabricate each metal locker with an individual door and frame; individual top, bottom, and back; and common intermediate uprights separating compartments.
- C. Equipment: Provide each locker with an identification plate and the following equipment:
 - 1. Single-Tier Units: Shelf, one double-prong ceiling hook, and two single-prong wall hooks.
 - 2. Double-Tier Units: One double-prong ceiling hook and two single-prong wall hooks.
 - 3. Triple-Tier Units: One double-prong ceiling hook.
 - 4. Coat Rods: As indicated on Drawings.
- D. Knocked-Down Construction: Fabricate metal lockers by assembling at Project site using manufacturer's nuts, bolts, screws, or rivets.
- E. Accessible Lockers: Fabricate as follows:
 - 1. Locate bottom shelf no lower than 15 inches above the floor.
 - 2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches above the floor.
- F. Continuous Zee Base: Fabricated in lengths as long as practical to enclose base and base ends; finished to match lockers.

- G. Continuous Sloping Tops: Fabricated in lengths as long as practical, without visible fasteners at splice locations; finished to match lockers.
 - 1. Sloping-top corner fillers, mitered.
- H. Recess Trim: Fabricated with minimum 2-1/2-inch face width and in lengths as long as practical; finished to match lockers.
- I. Filler Panels: Fabricated in an unequal leg angle shape; finished to match lockers. Provide slip-joint filler angle formed to receive filler panel.
- J. Finished End Panels: Fabricated to conceal unused penetrations and fasteners, except for perimeter fasteners, at exposed ends of nonrecessed metal lockers; finished to match lockers.
 - 1. Provide one-piece panels for double-row (back-to-back) locker ends.
- K. Center Dividers: Full-depth, vertical partitions between bottom and shelf; finished to match lockers.

2.6 ACCESSORIES

- A. Fasteners: Zinc- or nickel-plated steel, slotless-type, exposed bolt heads; with self-locking nuts or lock washers for nuts on moving parts.
- B. Anchors: Material, type, and size required for secure anchorage to each substrate.
 - 1. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls, and elsewhere as indicated, for corrosion resistance.
 - 2. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine walls and floors or support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install lockers level, plumb, and true; shim as required, using concealed shims.
 - 1. Anchor locker runs at ends and at intervals recommended by manufacturer, but not more than 36 inches o.c. Using concealed fasteners, install anchors through backup reinforcing plates, channels, or blocking as required to prevent metal distortion.
 - 2. Anchor single rows of metal lockers to walls near top and bottom of lockers.
 - 3. Anchor back-to-back metal lockers to floor.

- B. Knocked-Down Lockers: Assemble with manufacturer's standard fasteners, with no exposed fasteners on door faces or face frames.
- C. Equipment:
 - 1. Attach hooks with at least two fasteners.
 - 2. Attach door locks on doors using security-type fasteners.
 - 3. Identification Plates: Identify metal lockers with identification indicated on Drawings.
 - a. Attach plates to each locker door, near top, centered, with at least two aluminum rivets.
- D. Trim: Fit exposed connections of trim, fillers, and closures accurately together to form tight, hairline joints, with concealed fasteners and splice plates.
 - 1. Attach recess trim to recessed metal lockers with concealed clips.
 - 2. Attach filler panels with concealed fasteners. Locate filler panels where indicated on Drawings.
 - 3. Attach sloping-top units to metal lockers, with closures at exposed ends.
 - 4. Attach finished end panels using fasteners only at perimeter to conceal exposed ends of nonrecessed metal lockers.

3.3 ADJUSTING

- A. Clean, lubricate, and adjust hardware. Adjust doors and latches to operate easily without binding. If applicable verify that integral locking devices operate properly.

3.4 PROTECTION

- A. Protect metal lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.
- B. Touch up marred finishes or replace metal lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION

SECTION 116100

LABORATORY FUME HOODS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Double sided teaching and demonstration laboratory fume hoods, restricted-pass for use in variable air volume (VAV) HVAC exhaust system.
 - 2. Electrical service fittings located in or on fume hoods.
 - 3. Face velocity airflow alarm devices including calibration.
 - 4. Pre-wiring of new fume hoods by the manufacturer.
 - 5. All special or custom options indicated.
- B. Related Sections include the following:
 - 1. Division 12 Section "Laboratory Casework" for countertops, sinks and cabinets not directly affixed to the fume hood.
 - 2. Mechanical Specifications for field quality control testing of fume hoods.
 - 3. Mechanical Specifications for fume hood duct connections, including ducts.
 - 4. Electrical Specifications for installing service fittings in fume hoods, wiring in or on fume hoods, including light bulbs for light fixtures, and other electrical devices.

1.3 PERFORMANCE REQUIREMENTS

- A. Containment: Provide fume hoods that comply with the following when tested according to ASHRAE 110 at a release rate of 4.0 L/min.:
 - 1. Face Velocity: 80 fpm.
 - 2. Face Velocity Variation: Not more than 10 percent of average face velocity.
 - 3. Sash Position: 18 inch
 - 4. As-Manufactured (AM) Rating: AM 0.01 ppm.
- B. Static-Pressure Loss: Not more than 1/4-inch wg at 100-fpm face velocity when tested according to Paragraph 6.4.2.4 in SEFA 1.2, "Laboratory Fume Hoods-Recommended Practices."

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For laboratory fume hoods. Include plans, elevations, sections, details, and attachments to other work.

1. Indicate details for anchoring fume hoods to permanent building construction including locations of blocking and other supports.
 2. Indicate locations and types of service fittings together with associated service supply connection required.
 3. Indicate custom options such as distillation racks, vision panels, stops, etc. and custom features including grommets and piping for passing of University's cords and piping through fume hood superstructure.
 4. Indicate duct connections, electrical connections, and locations of access panels.
 5. Include roughing-in information for mechanical, plumbing, and electrical connections.
 6. Show adjacent walls, doors, windows, other building components, laboratory casework, and other laboratory equipment. Indicate clearances from above items.
 7. Include coordinated dimensions for laboratory equipment specified in other Sections.
- C. As may be required to achieve the Project Schedule or at the contractor's option, prepare Shop Drawings for fume hoods separate from metal laboratory casework such that the review/approval process for fume hoods can be prioritized and fume hoods can, if required, be ordered separately from metal laboratory casework.

1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain laboratory fume hoods through one source from a single manufacturer.
1. Obtain through same source and from same manufacturer as laboratory casework specified in Division 12 Section "Laboratory Casework."
- B. Product Designations and Basis-of-Design: Drawings indicate sizes, types, and configurations of fume hoods by referencing manufacturer's catalog numbers based on Kewaunee Scientific Corporation; Laboratory Division. Other specified manufacturers' hoods of similar sizes, types, and configurations, and complying with the Specifications may be considered. Refer to Division 01 Section "Product Requirements."
1. Where one manufacturer's standard product does not meet the design intent of the basis-of-design product, such manufacturer will furnish a custom product that does meet the design intent.
- C. Product Standard: Comply with SEFA 1.2, "Laboratory Fume Hoods-Recommended Practices."
- D. Safety Glass: Products complying with testing requirements in 16 CFR 1201 for Category II materials.
1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
- E. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not relocate existing, deliver new or install fume hoods until building is enclosed, wet work and utility roughing-in are complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.8 COORDINATION

- A. Coordinate installation of fume hoods with metal laboratory casework, fume hood exhaust ducts, mechanical, plumbing, and electrical work.
- B. Coordinate with the Mechanical Contractor the completion of HVAC air balancing prior to calibrating air flow alert devices.

1.9 EXTRA MATERIALS

- A. Furnish complete touchup kit for each type and color of fume hood finish provided. Include fillers, primers, paints, and other materials necessary to perform permanent repairs to damaged fume hood finish.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Basis of Design: Kewaunee Scientific Corporation; Laboratory Division.
 - 2. Mott Manufacturing Ltd., Brantford, Ontario, Canada.
 - 3. Labconco, Kansas City, MO.
 - 4. Air Master Systems.
- B. Basis-of-Design: Fume hoods shall be as follows:
 - 1. Fume Hood: Kewaunee Duo-Vision Demonstration width per drawings, vertical rising sash, fume hoods, Model T95G4860X. Restricted by-pass for use with a variable air volume HVAC system design, with all manufacturer's standard options, except as noted otherwise herein.
 - a. Provide with all special options as indicated herein or on the Drawings.
 - 1) Cord Ports: Provide one cord port in each side post.
 - 2. Electronic Sash Stop: On all fume hoods provide an electronic sash stop. Exact position of sash stop as measured vertically above the lower deflector vane shall be coordinated with the Owner and mechanical drawings (18").
 - 3. Ceiling Enclosures: Provide a ceiling enclosure at the top of all fume hoods to fill the space between the top of the fume hood and the ceiling. Enclosures shall extend a minimum of 2-inches above the finish ceiling.
 - a. Sash Pockets: Provide sash pockets at top of all fume hoods to provide clearance for a fully opened sash where ceiling heights would impact sash operation.

4. Pre-wiring Option: All new fume hoods (superstructures) shall be pre-wired with all electrical devices including LED light fixtures and power for fume hood airflow monitor installed under this Contract.
 - a. Provide cut-outs and other necessary on-site assistance for the installation of all devices and service fixtures.
 - b. Power receptacles for airflow alarm devices shall be located on top of the fume hood no more than 12-inches from one accessible side of the fume hood.
 - c. Special dedicated circuits are required. All fume hoods shall be pre-wired with separate neutral wires creating dedicated circuits (one per duplex receptacle mounted on the fume hood jambs).

2.2 MATERIALS

- A. Steel Sheet: Cold-rolled commercial steel sheet, complying with ASTM A 1008/A 1008M; matte finish; suitable for exposed applications.
- B. Stainless-Steel Sheet: ASTM A 666, Type 304; stretcher-leveled standard of flatness.
- C. Laminated Safety Glass: ASTM C 1172, Kind LT, Condition A, Type I, Class I, Quality q3 with clear, polyvinyl butyral interlayer.
- D. Fasteners: Provide stainless-steel fasteners where exposed to fumes.

2.3 FABRICATION

- A. General: Preassemble fume hoods in factory to greatest extent possible. Disassemble fume hoods only as necessary for shipping and handling limitations. Fume hoods shall be capable of being partly disassembled as necessary to permit movement through a 35-by-79-inch door opening.
- B. Steel Exterior: Fabricate from steel sheet, not less than 0.0478 inch thick, with component parts screwed together to allow removal of end panels, front fascia, and airfoil and to allow access to plumbing lines and service fittings. Apply chemical-resistant finish to interior and exterior surfaces of component parts before assembly.
- C. Ends: Fabricate with double-wall end panels without projecting corner posts or other obstructions to interfere with smooth, even airflow. Close area between double walls at front of fume hood and as needed to house sash counterbalance weights, utility lines, and remote-control valves.
- D. Interior Lining: Provide manufacturer's standard lining.
- E. Lining Assembly: Unless otherwise indicated, assemble with stainless-steel fasteners or epoxy adhesive, concealed where possible. Seal joints by filling with chemical-resistant sealant during assembly.
 1. Fasten lining components to a rigid frame assembly fabricated from stainless steel and to which exterior panels are attached.
 2. Punch fume hood lining side panels to receive service fittings and remote controls. Provide removable plug buttons for holes not used for indicated fittings.
- F. Exhaust Plenum: Full width of fume hood and with adequate volume to provide uniform airflow from hood, of same material as hood lining, and with duct stub for exhaust connection.
 1. Duct-Stub Material: Stainless steel. Coordinate shape and location of exhaust connection with mechanical drawings. Where the fume hood manufacturer's standard connection is a

different shape/size than the exhaust duct shown on the mechanical drawings, the fume hood manufacturer shall provide an appropriate transition duct.

- G. Sashes: Provide operable, vertical, sashes.
1. Fabricate from 0.0478-inch-minimum thickness steel sheet, with chemical-resistant finish. Form into four-sided frame with bottom corners welded and finished smooth. Make top member removable for glazing replacement. Set glazing in chemical-resistant, U-shaped gaskets.
 2. Glaze with laminated safety glass, with 3-mm-thick plies.
 3. Fume hood sash support to use notched belt and shaft interlocked gears. Belt to be polyurethane with green polyamide fabric on notch side, 10 mm x 5 - 6 mm rated at 3600 N tensile strength.
 4. Provide sash opening height of 28 to 38 ½" inches, unless otherwise indicated. For custom hoods of increased height, sash open shall also be increased by the same dimension.
- H. Provide airfoil at bottom of sash opening to direct airflow across countertop from 1-inch space between airfoil and countertop.
1. Fabricate airfoil from steel, painted to match base cabinetry.
 2. Radius airfoil at front edge to streamline the airflow resulting in low turbulence.
- I. Light Fixtures: Provide LED light fixture in the hood roof in lieu of standard florescent light fixture.
1. Light to provide 15 intensity adjustment levels and three color options.
 2. Illumination at worksurface shall be 100 footcandles.
 3. Fixture to be isolated from hood by a 1/4" thick tempered glass panel.
 4. Fixture to be UL rated.
- J. Filler Strips: Provide as needed to close spaces between fume hoods or fume hood base cabinets and adjacent building construction. Fabricate from same material and with same finish as fume hoods or fume hood base cabinets, as applicable.
- K. Comply with requirements in Mechanical, Plumbing, and Electrical Specifications (found on the Drawings) for installing water and laboratory gas service fittings, piping, electrical devices, and wiring. Install according to Shop Drawings. Securely anchor fittings, piping, and conduit to or on fume hoods, unless otherwise indicated.

2.4 CHEMICAL-RESISTANT FINISH

- A. Preparation: Clean steel surfaces, other than stainless steel, of mill scale, rust, oil, and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it.
- B. Chemical-Resistant Finish: Immediately after cleaning and pretreating, apply fume hood manufacturer's standard two-coat, chemical-resistant, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils.
1. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8. Acceptance level for chemical spot test shall be no more than four Level 3 conditions.
 2. Colors for Fume Hood Finish: Chosen from manufacturer's standard range.

2.5 ACCESSORIES

- A. Electrical Devices, Boxes, Wire, and Faceplates: Comply with requirements in the Electrical Specifications in addition to those requirements specified herein.
1. Provide electrical devices, boxes, and face plates that are U.L. listed.
 2. Provide cover plates that are fabricated of bright stainless steel, designed for the device for which it is used.
 3. Wire will be 10-AWG, copper, stranded, type THWN-THHN, 75-degrees C., 600 volt.
 4. Provide all electrical devices and boxes indicated below or as shown on the Shop Drawings by catalog number of the manufacturer upon which the specification is based.
 - a. Power Receptacles:
 - 1) Type of Fitting: Flush-mounted, single-gang box, 3-1/2 inches deep, gangable with ears, U.L. listed, equal to Raco #601NC.
 - 2) Device: One, GFCI receptacle, duplex type, specification grade, 20 ampere, 125 volt, 2-pole, 3-wire grounding type, Hubbell Extra Heavy Duty Autoguard Self-Test, #GFR5362SGW, feed through type, capable protecting downstream receptacles on a single circuit. Color: White.
 - 3) Faceplate: Commercial grade, stainless steel, bright finish, secured in place with stainless steel screws.
 - 4) Kewaunee: Similar to Model No. 656-1V, except provide components listed above.
 - b. Light Switches – (for fume hood light fixture(s):
 - 1) Type of Fitting: Flush-mounted, single-gang box, 2-1/2 inches deep, gangable with ears, U.L. listed, equal to Raco #519NC.
 - 2) Device: One, toggle type for single pole, specification grade, 20 ampere, 120/277 volt, quiet type, with ground screw, Hubbell-Pro Heavy Duty Industrial Series, #1221W. Color: White.
 - 3) Faceplate: Commercial grade, stainless steel, bright finish, secured in place with stainless steel screws.
 - 4) Kewaunee: Similar to Model No. 655-1V, except provide components listed above.
 - c. Alternate Manufacturers: In addition to the above listed Hubbell devices, other acceptable manufacturers of equivalent devices include Pass & Seymour or Leviton. All devices provided on this project for all fume hoods and casework shall be sourced from only one of the specified manufacturers.
- B. Airflow Alert Device: Kewaunee Model #X-018718, “Air Alert 600 Fume Hood Monitor” mounted on the fume hood fascia consisting of a thermistor sensor mounted on the monitor and connected with a tube to the fume hood containment cavity:
1. Control monitor will measure and record fume hood face velocity and sound an alarm when the airflow falls below safe levels.
 2. Glowing green, amber, and red LED lights will signal safe, marginal, and low face velocity conditions.
 3. Alarm and warning lights shall be augmented by a digital liquid crystal readout and a visual one-hour “Event Timeline” that records alarm occurrences and their length for a continually updated one-hour time interval.
 4. Control monitor will also contain a test/reset button that allows the fume hood user to verify alarm readiness.
 5. Alarm set points, metric or classical units, alarm delay intervals, and muting options shall all be programmable.

6. Control monitor shall operate on 9-30 volts AC or DC power and be provided with an adapter that shall be run concealed and tied into a permanent 120V power circuit in the pre-wired fume hood option.
- C. Sash Stops: Provide fume hoods with sash stops to limit hood opening to 18-inches sash height. Sash stops can be manually released to open sash fully for cleaning fume hood and for placing large apparatus within fume hood (Kewaunee Option "8").
1. Furnish and install Sash Open Safety Labels on left fume hood jambs to correspond with the sash stop position specified above.
 2. Prior to installing sash stops, confirm exact placement with the Owners Representative.
 3. Provide two (2) Kewaunee Model #F-4803-00 sash open safety label, one on each side of fume hood at the same height as the sash stops. This height shall be the maximum height for safe operating condition.

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 fume hoods.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install fume hoods according to Shop Drawings and manufacturer's written instructions.
1. Install level, plumb, and true; shim as required, using concealed shims, and securely anchor to building and adjacent laboratory casework.
 2. Securely attach access panels, but provide for easy removal and secure reattachment.
 3. Where fume hoods abut other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- B. Comply with requirements in Electrical Specifications for installing electrical devices and wiring. Install according to Shop Drawings and manufacturer's written instructions. Securely anchor fittings, piping, and conduit to fume hoods, unless otherwise indicated.
1. All conduit and devices to be furnished loose under this Section, shall be provided to the trade responsible for installation.
 2. Refer to Electrical Specifications and Electrical Drawings for electrical installation information and requirements.

3.3 FIELD QUALITY CONTROL

- A. Field test all new and existing fume hoods installed in this project according to ASHRAE 110 as modified in Part 01 "Performance Requirements" Article to verify compliance with performance requirements.
1. Adjust fume hoods, hood exhaust fans, and building's HVAC system, or replace new hoods and make other corrections until tested hoods perform as specified.

2. Following completion and approval of HVAC air balancing, calibrate face velocity airflow alarm devices.
3. After making corrections, retest fume hoods that failed to perform as specified.

3.4 ADJUSTING AND CLEANING

- A. Adjust moving parts for smooth, near silent, accurate sash operation with one hand. Adjust sashes for uniform contact of rubber bumpers. Verify that counterbalances operate without interference.
- B. Clean finished surfaces, including both sides of glass; touch up as required; and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect and University.

END OF SECTION

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 rollers.
- 2. Motor-operated roller shades with single rollers.

- B. Related Requirements:

- 1. Section 061053 "Miscellaneous Rough Carpentry" for wood blocking and grounds for mounting roller shades and accessories.
- 2. Division 26 Electrical sections for electric service for motor controls.

1.3 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 Verification: For each type of roller shade.

- 1. Shadeband Material: Not less than 3 inches square. Mark interior face of material if applicable.

- D. Product Schedule: For roller shades. Use same designations indicated on Drawings.

- E. Qualification Data: For Installer.

- F. Operation and Maintenance Data: For roller shades to include in maintenance manuals.

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. 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.

1.5 WARRANTY

- A. Roller Shade Hardware and Chain Warranty: Manufacturer's standard non-depreciating warranty for interior shading.
 - 1. Shade Hardware: 10 years unless otherwise indicated.
 - a. Motor operated system with manufacturers standard shade fabric: 25 years.
 - 2. Standard Shadecloth: Manufacturer's standard twenty-five year warranty.
 - 3. Roller Shade Motors, Motor Control Systems, and Accessories: Manufacturer's standard non-depreciating five year warranty.
 - 4. Roller Shade Installation: One year from date of Substantial Completion.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Installer to be an approved for installation by the fabricator of products.

1.7 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.

1.8 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. Manufacturer: Subject to compliance to requirements, provide products by Draper, Inc. or comparable product by one of the following:
 - 1. Hunter Douglas Contract.
 - 2. MechoShade Systems, LLC.
- B. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MANUALLY OPERATED SHADES WITH SINGLE ROLLERS

- A. Basis of Design Product: Subject to compliance to requirements, provide Draper Clutch Operated FlexShades.
- B. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
 - 1. 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: Chain tensioner, sill mounted.
 - 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 or for shades as recommended by manufacturer, whichever criterion is more stringent.
- C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
 - 1. Roller Drive-End Location: As indicated on Drawings.
 - 2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller
 - 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- E. 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.
- F. 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.

G. Installation Accessories:

1. 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 5 inches.
 - b. Endcap Covers: To cover exposed endcaps.
2. Installation Accessories Color and Finish: Clear anodized.

2.3 MOTOR-OPERATED, SINGLE-ROLLER SHADES

A. Basis of Design Product: Subject to compliance to requirements, provide Draper Motorized Flex Shade AC.

B. Motorized Operating System: Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-rewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Electric Motor: Manufacturer's standard tubular, enclosed in roller.
 - a. Maximum Total Shade Width: As required to operate roller shades indicated.
 - b. Maximum Shade Drop: As required to operate roller shades indicated.
 - c. Maximum Weight Capacity: As required to operate roller shades indicated.
3. Remote Control: Electric controls with NEMA ICS 6, Type 1 enclosure for recessed or flush mounting. Provide the following for remote-control activation of shades:
 - a. Individual Switch Control Station: Maintained contact, three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions
 - b. Individual/Group Control Station: Maintained contact, three-position, rocker-style, wall-switch-operated control station with open, close, and center off functions for individual and group control.
 - c. Microprocessor Control: Electronic programmable means for setting, changing, and adjusting control features; isolated from voltage spikes and surges.
 - d. Color: As selected by Architect from manufacturer's full range.
4. Limit Switches: Adjustable switches interlocked with motor controls and set to stop shades automatically at fully raised and fully lowered positions.
5. Operating Features:
 - a. Group switching with integrated switch control; single faceplate for multiple switch cutouts.

C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: As indicated on Drawings.
 2. Direction of Shadeband Roll: Regular, from back (exterior face) of roller
 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
1. Bracket System: MechoShade Catch-Pin Brackets for pocket mounting.
- E. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers that are operated by one roller drive-end assembly.
- F. 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.
- G. Installation Accessories:
1. 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 5 inches.
 - b. Endcap Covers: To cover exposed endcaps.
 2. Installation Accessories Color and Finish: Clear anodized.

2.4 SHADEBAND MATERIALS

- A. Shadeband Material Flame-Resistance Rating: Comply with NFPA 701 Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- B. Light-Filtering Fabric Type 1: Woven fabric, stain and fade resistant (typical).
1. Source: Roller shade manufacturer
 2. Type: PVC-coated polyester.
 3. Weave: Basketweave.
 4. Roll Width: Up to 98 inches.
 5. Orientation on Shadeband: Railroaded.
 6. Openness Factor: 3 percent.
 7. Color: As selected by Architect from manufacturer's full range.
- C. Light-Filtering Fabric Type 2: At rooms; Large Conference 110, Exam Rooms (154, 156 & 158), Counsel 160, Studio 303 and Control Room 303A.
1. Source: Roller shade manufacturer
 2. Type: PVC-coated polyester.
 3. Roll Width: Up to 98 inches.
 4. Orientation on Shadeband: Railroaded.
 5. Openness Factor: 1 percent.

6. Color: As selected by Architect from manufacturer's full range.

2.5 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.
 1. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.
- 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. 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. Headbox and End Covers: Install to conceal roller and operating mechanism. Do not use exposed fasteners.
- C. Electrical Connections: Connect motor-operated roller shades to building electrical system and building automation system.
- D. 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

SECTION 123553

LABORATORY CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Wood laboratory casework.
 - 2. Laboratory countertops and sinks.
- B. Related Sections include the following:
 - 1. Section 116100 "Laboratory Fume Hoods" for fume hoods.
 - 2. Mechanical, Plumbing and Electrical Specifications and Drawings for providing and installing all laboratory service fittings and devices specified in those Divisions.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For wood laboratory casework. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Indicate locations of blocking and reinforcements required for installing laboratory casework.
 - 2. Indicate locations and types of service fittings, together with associated service supply connection required.
 - 3. Include details of utility spaces showing supports for conduits and piping.
 - 4. Indicate locations of and clearances from adjacent walls, doors, windows, other building components, and other laboratory equipment.
 - 5. Include coordinated dimensions for laboratory equipment and laboratory fume hoods specified in other Sections.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating compliance of laboratory casework finishes and countertops with requirements specified for chemical and physical resistance.

1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified for testing indicated, as documented according to ASTM E 548.
- B. Source Limitations: Obtain laboratory casework, including countertops, sinks, service fittings, and accessories, through one source from a single manufacturer.

- C. Product Designations and Basis-of-Design: Drawings indicate sizes and configurations of laboratory casework by referencing designated manufacturer's catalog numbers based on Kewaunee Scientific Corp. Other specified manufacturers' laboratory casework of similar sizes, similar door and drawer configurations, and complying with the Specifications are acceptable.
- D. Product Standard: Comply with SEFA 8, "Laboratory Furniture--Casework, Shelving and Tables--Recommended Practices."
- E. Flammable Liquid Storage: Where cabinets are indicated for solvent or flammable liquid storage, provide units that are listed and labeled as complying with requirements of NFPA 30 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Cabinets that are not listed and labeled but are constructed according to NFPA 30, Paragraph 4-3.3(b) may be used if acceptable to authorities having jurisdiction.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect finished surfaces during handling and installation with protective covering of polyethylene film or other suitable material.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install wood laboratory casework until building is enclosed, wet work and utility roughing-in are complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.7 COORDINATION

- A. Coordinate layout and installation of framing and reinforcements for support of wood laboratory casework.
- B. Coordinate installation of wood laboratory casework with installation of other laboratory equipment.
- C. Coordinate installation of devices and fittings supplied by others for installation such as electrical devices, boxes, laboratory service fittings, plumbing fixtures, etc.

1.8 EXTRA MATERIALS

- A. Furnish complete touchup kit for each type and color of wood laboratory casework provided. Include scratch fillers, stains, finishes, and other materials necessary to perform permanent repairs to damaged laboratory casework finish.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. System Structural Performance: Laboratory casework and support framing system shall withstand the effects of the following gravity loads and stresses without permanent deformation, excessive deflection, or binding of drawers and doors:
1. Support Framing System: 600 lbs./ft.
 2. Work Surfaces (Including Tops over Kneespaces): 160 lbs./ft.
 3. Wall Cabinets (Upper Cabinets): 160 lbs./ft.
 4. Shelves: 40 lbs./sq. ft.

2.2 MANUFACTURERS

- A. Wood Laboratory Casework Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Basis-of-Design: Kewaunee Scientific: Wood, Signature Series Laboratory Casework
 2. CIF Lab Solutions.
 3. Mott Manufacturing.

2.3 CABINET MATERIALS

- A. General:
1. Certified Wood Materials: Provide cabinets made from wood and wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."
 2. Adhesives: Do not use adhesives that contain urea formaldehyde.
 3. Maximum Moisture Content for Lumber: Seven (7) percent for hardwood and 12 percent for softwood.
 4. Hardwood Plywood: HPVA HP-1, either veneer core or particle core, unless otherwise indicated.
 5. Particleboard: ANSI A208.1, Grade M-2.
 6. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
 7. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.
 8. Edgebanding for Wood-Veneered Construction: Minimum 1/8-inch-thick, solid wood of same species as face veneer or wood veneer of same species as face veneer.
- B. Exposed Materials:
1. General: Provide materials that are selected and arranged for compatible grain and color. Do not use materials adjacent to one another that are noticeably dissimilar in color, grain, figure, or natural character markings.
 2. Wood Species and Veneer Cut: Select white maple, plain sawn.
 3. Stain Colors and Finishes: Match building standard.
 4. Solid Wood: Clear hardwood lumber.
 5. Plywood: Hardwood plywood; Grade A exposed faces at least 1/50 inch thick, Grade J crossbands, and backs of same species as faces
 6. Cabinet Design: Flush overlay, to match building standards.
- C. Semi-exposed Materials:

1. Solid Wood: Sound hardwood lumber, selected to eliminate appearance defects, of same species as exposed solid wood.
2. Plywood: Hardwood plywood of same species as exposed plywood. Grade B or C faces, Grade J crossbands, and backs of same species as faces. Semi-exposed backs of plywood with exposed faces shall be same species as faces.

D. Concealed Materials:

1. Solid Wood: Any hardwood or softwood species, with no defects affecting strength or utility.
2. Plywood: Hardwood plywood. Concealed backs of plywood with exposed or semi-exposed faces shall be same species as faces.
3. Hardboard: AHA A135.4, Class 1 tempered.

E. Acid Storage-Cabinet Lining: ¼ inch thick, polyethylene lining materials.

F. Glass for Glazed Doors: Where required by Drawing details, clear tempered glass complying with ASTM C 1048, Kind FT, Condition A, Type I, Class 1, Quality q³; not less than 5.5 mm thick.

2.4 CABINET FABRICATION

A. Construction: Provide wood-faced laboratory casework of the following minimum construction.

1. Specified manufacturer's standard construction.

B. Leg Shoes: Vinyl or rubber, black, open-bottom type.

C. Utility-Space Framing: Laboratory casework manufacturer's standard steel framing units consisting of 2 steel slotted channels complying with MFMA-2, not less than 1-5/8 inches square by 0.0966 inch thick, and connected together at top and bottom by U-shaped brackets made from 1-1/4-by-1/4 inch steel flat bars. Framing units may be made by welding specified channel material into rectangular frames instead of using U-shaped brackets.

D. Filler Strips and Utility-Space Closure Panels: Provide as needed to close spaces between cabinets and walls, ceilings, and indicated equipment.

1. Fabricate from same material and with same finish as adjacent cabinet surfaces.

E. Fume Hood Flammable (Solvent) Storage Cabinets: Where indicated on the Drawings under fume hood superstructures shall be the manufacturer's standard U.L. listed, wood, flammable (solvent) storage cabinet. Provide with vent plugs if vent pipe inlets/outlets are provided – cabinets will not be vented via a duct connection.

1. Construction Standards: Must meet UFC, OSHA, and NFPA NO. 30-1993 construction standards and by listed by Underwriter's Laboratories.
2. Provide with manufacturer's standard label "CAUTION FLAMMABLE – KEEP FIRE AWAY."
3. Ground Bars: For locations where grounding bars are to be mounted within cabinet space as detailed on the Drawings shall be similar to 'Cadweld' Bus Bars, 1/4" thick, solid copper. Provide without insulators and with (4) - 9/32-inch diameter holes each end spaced at 1-inch on center. Provide spacer in lieu of insulators. Both sides of bar shall be exposed such that alligator style clamps make direct contact to copper bar on both sides. Final connection of ground bar to grounding system shall be by the Electrical Contractor.
4. Provide with special, heavy-duty, shelf clips designed to be rigidly fastened into place with screws or bolts (will not fall out).

- F. Fume Hood Acid Storage Cabinets: Where indicated on the Drawings for installation under fume hood superstructures shall be manufacturer's standard wood cabinet for storage of corrosive chemicals.
1. Provide with one-piece, molded, linear low density polyethylene tub with coved corners and a 1-inch high integral lip at the bottom front.
 2. Cabinet doors shall be lined with 1/8-inch thick polyethylene sheet and latched using a nylon roller bearing. Doors shall have louvers for added ventilation.
 3. Furnish with a 1-1/2-inch diameter PVC vent pipe assembly for venting cabinet interior to the fume hood above. This vent will not be connected directly to the HVAC exhaust duct system.
 4. Provide with optional, half-depth, white PVC coated, removable, heavy duty, wire shelf.

2.5 WOOD FINISH

- A. Preparation: Sand lumber and plywood for laboratory casework construction before assembling. Sand edges of doors, drawer fronts, and molded shapes with profile-edge sander. Sand casework after assembling for uniform smoothness at least equivalent to that produced by 220 grit sanding and without machine marks, cross sanding, or other surface blemishes.
- B. Staining: Remove fibers and dust and apply stain to exposed and semi-exposed surfaces as necessary to match approved samples. Apply stain in a manner that will produce a consistent appearance. Apply wash-coat sealer before applying stain to closed-grain wood species.
- C. Chemical-Resistant Finish: Apply laboratory casework manufacturer's standard two-coat, chemical-resistant, transparent finish consisting of sealer and catalyzed topcoat(s). Sand and swipe clean between coats. Topcoat(s) may be omitted on concealed surfaces.
1. Chemical and Physical Resistance of Finish System: Finish complies with acceptance levels of cabinet surface finish tests in SEFA 8. Acceptance level for chemical spot test shall be no more than four Level 3 conditions.

2.6 HARDWARE

- A. Provide laboratory casework manufacturer's standard satin-finish, commercial-quality, heavy-duty hardware complying with requirements indicated for each type.
- B. Cabinet Hardware:
1. Hinge: Stainless steel, five knuckle; Kewaunee Scientific, Style '0'.
 2. Pulls: Motised pulls, Epcos #DP41-A3.
- C. Hinges: Overlay, 5-knuckle, fully-concealed hinges:
1. Material: Type 304 stainless steel .089 thick, 2-1/2" high, with brushed satin finish.
 2. Hinges shall be the institutional type with a five-knuckle bullet-type barrel.
 3. Hinges shall be attached to both door and case with two screws through each leaf. Welding of hinges to door or case will not be acceptable.
 4. Doors under 36" in height shall be hung on one pair of hinges, and doors over 36" in height shall be hung on three hinges.
- D. Door Catches: A two-piece, heavy-duty, cam action positive catch.
1. Main body of the catch shall be confined within an integral cabinet top or divider rail, while latching post shall be mounted on the hinge side of door.

2. Polyethylene roller type catches are not acceptable.
 3. Provide two (2) catches on doors more than 48 inches in height.
- E. Drawer Slides: Powder-coated, full-extension, self-closing, heavy-duty drawer slides; designed to prevent rebound when drawers are closed; with nylon-tired, ball-bearing rollers; complying with BHMA A156.9, Type B05091, and rated for 150 lbf.
- F. Locks: When indicated on the Drawings or called for, shall be pin tumbler type with heavy duty interchangeable cylinder.
1. Exposed lock noses shall be dull nickel (satin) plated and stamped with identifying numbers.
 2. Locks shall have capacity for 2000 primary key changes and Master Keyed one level with the potential of 5 different, non-interchangeable Master Key groups.

2.7 COUNTERTOPS AND BACKSPLASHES

- A. Countertops, General: Provide units with smooth surfaces in uniform plane free of defects. Make exposed edges and corners straight and uniformly beveled. Provide front and end overhang of 1 inch, with continuous drip groove on underside 1/2 inch from edge.
- B. Laboratory Countertop and Sink Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Basis-of-Design: Kewaunee Scientific, Kemresin Work Tops.
 2. CIF Lab Solutions.
 3. Mott Manufacturing.
- C. Kemresin Countertops and Backsplashes: Factory molded of modified epoxy-resin formulation with smooth, non-specular finish.
1. Physical Properties:
 - a. Flexural Strength: No less than 15,000 psi.
 - b. Modulus of Elasticity: Not less than 2,000,000 psi.
 - c. Hardness (Rockwell M): Not less than 100.
 - d. Water Absorption (24 Hours): Not more than 0.04 percent.
 - e. Heat Distortion Point: Not less than 260 deg. F.
 2. Chemical Resistance: Epoxy-resin material has the following ratings when tested with indicated reagents according to NEMA LD 3, Test Procedure 3.4.5:
 - a. No Effect: Acetic acid (98 percent) acetone, ammonium hydroxide (28 percent), benzene, carbon tetrachloride, dimethyl formamide, ethyl acetate, ethyl alcohol, ethyl ether, methyl alcohol, nitric acid (70 percent), phenol, sulfuric acid (60 percent), and toluene.
 - b. Slight Effect: Chromic acid (60 percent) and sodium hydroxide (50 percent).
 3. Color: Black.
 4. Countertop Fabrication: Fabricate with factory cutouts for sinks and with butt joints assembled with epoxy adhesive and pre-fitted, concealed metal splines.
 - a. Countertop Configuration: Flat, 1-inch thick, with beveled or rounded edge and corners, and with drop groove and integral 4-inches high coved backsplash.
 - b. Countertop Construction: Uniform throughout full thickness.
 5. Curbs and Backsplashes:

- a. Fabricated o same material as countertops.
- b. Size: 4-inches high x 3/4-inch thickness.
- c. Manufacturer's Option: Integral backsplashes in lieu of set-on type.

2.8 SINKS AND FIXTURES

A. Sinks:

1. Type S-1: Epoxy-Drop-in, equal to Kewaunee, Model No. 1005 D1-BK.
2. Type S-2: Black Polyolefin resin, Cup Sink, equal to Kewaunee, Model No. 0491-BP. Inside dimensions 6 by 3 inches.

B. Vacuum, Gas and Compressed Air Fittings:

1. Deck mounted, single, straight, laboratory ball valve fittings, equal to Kewaunee, Model No.W-0260-00.
 - a. Type F-1: Vacuum fitting.
 - b. Type F-2: Gas fitting.
 - c. Type F-3: Compressed air fitting.

2.9 ACCESSORIES

- A. Pegboards: Shall be equal to Inter Dyne Systems, Inc., 20-gauge, Type 304 stainless steel construction to resist corrosion damage, $\frac{3}{4}$ inch thick, height and width as scheduled herein. Pegs shall be 6 inches long x $\frac{1}{2}$ inch diameter with large cover plates to prevent water from collecting behind pegboard and be constructed of polypropylene. Pegboard shall have keyed slots that pegs fit into to prevent twisting. Provide a stainless steel drain trough with drain tubing, or length sufficient to reach into sink. Provide all mounting hardware and accessories as required for each condition. Pegboards shall be mounted to the casework in such a fashion as to ensure the drip outlet is accessible and that the required hose is in place.

1. Pegboard (use at all locations shown): 30 inches by 30 inches.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances.
1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION OF CABINETS

- A. Install level, plumb, and true; shim as required, using concealed shims. Where laboratory casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.
- B. Base Cabinets: Adjust top rails and subtops within 1/16 inch of a single plane. Fasten cabinets to utility-space framing, partition framing, wood blocking, or reinforcements in partitions with fasteners spaced not more than 24 inches o.c. Bolt adjacent cabinets together with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.

1. Where base cabinets are installed away from walls, fasten to floor at toe space at not more than 24 inches o.c. and at sides of cabinets with not less than 2 fasteners per side.

- C. Install hardware uniformly and precisely. Set hinges snug and flat in mortises.
- D. Adjust laboratory casework and hardware so doors and drawers align and operate smoothly without warp or bind and contact points meet accurately. Lubricate operating hardware as recommended by manufacturer.

3.3 INSTALLATION OF COUNTERTOPS

- A. Abut top and edge surfaces in one true plane with flush hairline joints and with internal supports placed to prevent deflection. Locate joints only where shown on Shop Drawings.
- B. Field Jointing: Where possible, make in the same manner as shop jointing using dowels, splines, adhesives, and fasteners recommended by manufacturer. Prepare edges to be joined in shop.
- C. Fastening:
 1. Secure countertops to cabinets with Z-type fasteners or equivalent, using two or more fasteners at each cabinet front, end, and back.
 2. Where necessary to penetrate countertops with fasteners, countersink heads approximately 1/8 inch and plug hole flush with material equal to countertop in chemical resistance, hardness and appearance.
- D. Provide required holes and cutouts for all service fittings and devices as indicated on the Drawings.
- E. Provide scribe moldings for closures at junctures of countertop, curb, and splash, with walls as recommended by manufacturer for materials involved. Match materials and finish to adjacent laboratory casework. Use chemical-resistant, permanently elastic sealing compound where recommended by manufacturer.
- F. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

3.4 INSTALLATION OF SINKS

- A. Installation of Epoxy Sinks: Use laboratory casework manufacturer's recommended adjustable support system for table- and cabinet-type installations. Set top edge of sink unit in sink and countertop manufacturers' recommended chemical-resistant sealing compound or adhesive and firmly secure to produce a tight and fully leakproof joint. Adjust sink and securely support to prevent movement. Remove excess sealant while still wet and finish joint for neat appearance.
- B. Provide fixtures, fittings, outlets and traps to subcontractor/tradesmen responsible for their installation. Require signed receipts at time of delivery for all products and materials supplied to others.

3.5 INSTALLATION OF ACCESSORIES

- A. Install accessories according to Shop Drawings and manufacturer's written instructions.

3.6 CLEANING AND PROTECTING

- A. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.
- B. Protect countertop surfaces during construction with 6-mil plastic or other suitable water-resistant covering. Tape to underside of countertop at minimum of 48 inches o.c.

END OF SECTION

SECTION 142123.16

MACHINE ROOM-LESS ELECTRIC TRACTION PASSENGER ELEVATORS

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. Machine-room-less electric traction passenger elevators.
- 2. Pit ladders.

B. Related Requirements:

- 1. Section 015000 "Temporary Facilities and Controls" for temporary use of elevators for construction purposes.
- 2. Section 033000 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
- 3. Section 042000 "Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry and for grouting elevator entrance frames installed in masonry walls.
- 4. Section 051200 "Structural Steel Framing" for the following:
 - a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
 - b. Divider beams.
 - c. Hoist beams.
- 5. Section 055000 "Metal Fabrications" for the following:
 - a. Attachment plates and angle brackets for supporting guide-rail brackets.
 - b. Structural-steel shapes for subsills.
 - c. Cants made from steel sheet in hoistways.
- 6. Section 096813 "Tile Carpeting" for finish flooring in elevator cars.
- 7. Section 099123 "Interior Painting" for field painting of hoistway entrance doors and frames.
- 8. Division 22 sections for sump pumps, sumps, and sump covers in elevator pits.
- 9. Division 27 communications cabling sections for twisted pair conductors in fire resistant rated traveling cable, used for telephone service for elevator and for connection to elevator controllers for remote monitoring of elevator performance.
- 10. Division 28 fire alarm system sections for smoke detectors in elevator lobbies to initiate emergency recall operation, for heat detectors in shafts and machine rooms to disconnect power from elevator equipment before or on sprinkler activation, and for connection to elevator controllers.

1.3 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.
- B. Service Elevator: A passenger elevator that is also used to carry freight.

1.4 SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
 - 2. 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, coordination with building structure, relationships with other construction, and locations of equipment.
 - 2. Include large-scale layout of car-control station and standby power operation control panel.
 - 3. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Samples for Initial Selection: For each type of exposed finish involving color selection.
- D. Samples for Verification: For exposed car, hoistway door and frame, and signal equipment finishes; 3-inch-square Samples of sheet materials; and 4-inch lengths of running trim members.
- E. Qualification Data: For Installer.
- F. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway and pit layout and dimensions, as indicated on Drawings, and electrical service including standby power generator, as shown and specified, are adequate for elevator system being provided.
- G. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
 - 1. Submit manufacturer's or Installer's standard operation and maintenance manual, according to ASME A17.1/CSA B44 including diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard one-year [two-year] [five-year] maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

1.8 COORDINATION

- A. Coordinate installation of inserts, sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, inserts, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate locations and dimensions of work specified in other Sections that relates to electric traction elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways and pits.

1.9 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
 - 2. Warranty Period: One year(s) from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design: Subject to compliance to requirements, provide Gen3 Edge by Otis Elevator Co. or equal product by one of the following:
 - 1. KONE Inc.
 - 2. Schindler Elevator Corp.
 - 3. ThyssenKrupp Elevator.
- B. Source Limitations: Obtain elevators from single manufacturer.
 - 1. Major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Requirements: Comply with requirements for accessible elevators in the United States Access Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.
- C. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and shall comply with elevator seismic requirements in ASME A17.1/CSA B44.
 - 1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified".
 - 2. Project Seismic Design Category: See Structural Drawings.
 - 3. Elevator Component Importance Factor: See Structural Drawings.
 - 4. Design earthquake spectral response acceleration short period (Sds) for Project: See Structural Drawings.
 - 5. Provide earthquake equipment required by ASME A17.1/CSA B44.
 - 6. Provide seismic switch required by ASCE/SEI 7.

2.3 ELEVATORS

- A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard elevator systems and as required for complete system.
- B. Elevator Description:
 - 1. Elevator Number: TBD
 - 2. Machine Type: Gearless traction.
 - 3. Rated Load: 4000 lb.
 - 4. Freight Loading Class for Service Elevator(s): Class A.
 - 5. Rated Speed: 150 fpm.
 - 6. Operation System: Selective-collective automatic operation.
 - 7. Auxiliary Operations:
 - a. Standby power operation.
 - b. Standby-powered lowering.
 - c. Earthquake Emergency Operation: Comply with requirements in ASME A17.1/CSA B44.
 - d. Automatic dispatching of loaded car.
 - e. Nuisance-call cancel.
 - f. Loaded-car bypass.
 - g. Off-peak operation.
 - h. Automatic operation of lights and ventilation fans.
 - 8. Security Features: Card-reader operation for access to all floors.
 - 9. Car Enclosures:
 - a. Inside Width: Not less than 65-9/16 inches from side wall to side wall.
 - b. Inside Depth: Not less than 84-7/8 inches from back wall to front wall (return panels).
 - c. Inside Height: Not less than 93 inches to underside of ceiling.
 - d. Front Walls (Return Panels): Satin stainless steel, ASTM A480/A480M, No. 4 finish with integral car door frames.

- e. Car Fixtures: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - f. Side and Rear Wall Panels: Plastic laminate.
 - g. Reveals: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - h. Door Faces (Interior): Satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - i. Door Sills: Aluminum.
 - j. Ceiling: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - 1) Six (6) panel ceiling with one LED light fixture in each panel.
 - 2) Light Fixture Efficiency: Not less than 35 lumens/W.
 - k. Handrails: 1/2 by 2 inches rectangular satin stainless steel at sides and rear of car.
 - 1) Provide a set of both high rails at standard height and low rails at 16 inches above the cab floor.
 - l. Floor prepared to receive resilient flooring (specified in Section 096813 "Tile Carpeting").
10. Hoistway Entrances:
- a. Width: 48 inches.
 - b. Height: 84 inches.
 - c. Type: Two-speed side sliding.
 - d. Frames Satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - f. Doors: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - h. Sills: Aluminum.
11. Hall Fixtures: Satin stainless steel, ASTM A480/A480M, No. 4 finish.
12. Additional Requirements:
- a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, ASTM A480/A480M, No. 4 finish.
 - b. Provide hooks for protective pads in all cars and one complete set(s) of full-height protective pads.
 - c. Provide railings complying with ASME A17.1/CSA B44 on top of car where required by ASME A17.1/CSA B44.

2.4 TRACTION SYSTEMS

- A. Elevator Machines: Permanent magnet, variable-voltage, variable-frequency, ac-type hoisting machines and solid-state power converters.
 - 1. Provide regenerative system that complies with the IgCC.
 - 2. Limit total harmonic distortion of regenerated power to 5 percent per IEEE 519.
 - 3. Provide means for absorbing regenerated power when elevator system is operating on standby power.
 - 4. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into building power system.
- B. Fluid for Hydraulic Buffers: Fire-resistant fluid.
- C. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.

- D. Machine Beams: Provide steel framing to support elevator hoisting machine and deflector sheaves from the building structure. Comply with Section 055000 "Metal Fabrications" for materials and fabrication.
- E. Car Frame and Platform: Bolted- or welded-steel units.
- F. Guides: Roller guides or polymer-coated, nonlubricated sliding guides. Provide guides at top and bottom of car and counterweight frames.
- G. Steel Pit Ladders: Manufacturer to provide required ladders meeting their requirements and that meet all regulatory requirements:
 - 1. Space siderails of elevator pit ladders minimum 12 inches apart.
 - 2. Siderails: Continuous, 3/8-by-2-1/2-inch steel flat bars, with eased edges.
 - 3. Rungs: 3/4-inch-steel bars.
 - 4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
 - 5. Provide nonslip surfaces on top of each rung by coating with abrasive material metallicity bonded to rung.
 - 6. Support each ladder at top and bottom and not more than 60 inches o.c. with welded or bolted steel brackets.
 - 7. Prime interior ladders, including brackets and fasteners, with primers that comply with Section 099123 "Interior Painting."

2.5 OPERATION SYSTEMS

- A. Provide manufacturer's standard microprocessor operation systems as required to provide type of operation indicated.
 - 1. Required electrical power and communications connections to be coordinated with the fire resistant rated traveling cable for cab power and lighting, two way telephone communication and other required systems.
- B. Auxiliary Operations:
 - 1. Single-Car Standby Power Operation: On activation of standby power, car is returned to a designated floor and parked with doors open. Car can be manually put in service on standby power, either for return operation or for regular operation, by switches in control panel located at main lobby. Manual operation causes automatic operation to cease.
 - 2. Single-Car Standby-Powered Lowering:
 - a. On activation of standby power, car is lowered to the main lobby [lowest floor], opens its doors, and shuts down.
 - 3. Automatic Dispatching of Loaded Car: When car load exceeds 80 percent of rated capacity, doors begin closing.
 - 4. Nuisance-Call Cancel: When car calls exceed a preset number while car load is less than a predetermined weight, all car calls are canceled. Preset number of calls and predetermined weight can be adjusted.
 - 5. Loaded-Car Bypass: When car load exceeds 80 percent of rated capacity, car responds only to car calls, not to hall calls.
 - 6. Automatic Operation of Lights and Fan: When elevator is stopped and unoccupied with doors closed, lighting, ventilation fan, and cab displays are de-energized after five minutes and are re-energized before car doors open.

7. Independent Service: Keyswitch in car-control station removes car from group operation and allows it to respond only to car calls. Key cannot be removed from keyswitch when car is in independent service. When in independent service, doors close only in response to door close button.

C. Security features shall not affect emergency firefighters' service.

1. Card-Reader Operation: System uses card readers at car-control stations and hall push-button stations to authorize calls. Security system determines which landings and at what times calls require authorization by card reader. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers. Allow space for card reader in car.
2. Car-to-Lobby Feature: Feature, activated by keyswitch at main lobby, that causes car to return immediately to lobby and open doors for inspection. On deactivation by keyswitch, calls registered before keyswitch activation are completed and normal operation is resumed.

2.6 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.

1. Product: "Optiguard" – Door Protection System for Otis Elevators provided by Unitec Parts Company with the following:
 - a. Surface mounted, transmitter and receiver "edges" which emit and detect infrared beams.
 - b. Universal power supply and required cables, spacers and mounting accessories.

B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.7 CAR ENCLOSURES

A. Provide steel-framed car enclosures with nonremovable wall panels, with car roof, access doors, power door operators, and ventilation.

1. Provide standard railings complying with ASME A17.1/CSA B44 on car tops where required by ASME A17.1/CSA B44.

B. Materials and Finishes: Manufacturer's standards, but not less than the following:

1. Subfloor: Exterior, underlayment grade plywood, not less than 5/8-inch nominal thickness.
 - a. Floor Finish: Specified in Section 096813 "Tile Carpeting".
2. Stainless Steel Wall Panels: Flush, formed-metal construction; fabricated from stainless steel sheet.
3. Plastic-Laminate Wall Panels: Plastic laminate adhesively applied to 1/2-inch fire-retardant-treated particleboard with plastic-laminate panel backing and manufacturer's standard protective edge trim. Panels have a flame-spread index of 75 or less, when tested according to

ASTM E84. Plastic-laminate color, texture, and pattern as selected by Architect from plastic-laminate manufacturer's full range.

4. Fabricate car with recesses and cutouts for signal equipment.
5. Fabricate car door frame integrally with front wall of car.
6. Stainless Steel Doors: Flush, hollow-metal construction; fabricated from stainless steel sheet.
7. Sight Guards: Provide sight guards on car doors.
8. Sills: Extruded or machined metal, with grooved surface, 1/4 inch thick.
9. Metal Ceiling: Flush panels, with LED downlights in the center of each panel.
10. Light Fixture Efficiency: Not less than 35 lumens/W.
11. Ventilation Fan Efficiency: Not less than 3.0 cfm/W.

2.8 HOISTWAY ENTRANCES

- A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.
 1. Where gypsum board wall construction is indicated, frames shall be self-supporting with reinforced head sections.
- B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible according to NFPA 252 or UL 10B.
 1. Fire-Protection Rating: 1-1/2 hours with 30-minute temperature rise of 450 deg F (250 deg C).
- C. Materials and Fabrication: Manufacturer's standards, but not less than the following:
 1. Stainless Steel Frames: Formed from stainless steel sheet.
 2. Star of Life Symbol: Identify emergency elevators with star of life symbol, not less than 3 inches high, on both jambs of hoistway door frames.
 3. Stainless Steel Doors: Flush, hollow-metal construction; fabricated from stainless steel sheet.
 4. Sight Guards: Provide sight guards on doors matching door edges.
 5. Sills: Extruded or machined metal, with grooved surface, 1/4 inch thick.
 6. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C1107/C1107M.

2.9 SIGNAL EQUIPMENT

- A. Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Provide vandal-resistant buttons and lighted elements illuminated with LEDs.
- B. Swing-Return Car-Control Stations: Provide car-control stations mounted on rear of hinged return panel adjacent to car door and with buttons, switches, controls, and indicator lights projecting through return panel but substantially flush with face of return panel.
 1. Mark buttons and switches for function. Use both tactile symbols and Braille.
 2. Provide "No Smoking" sign matching car-control station, either integral with car-control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.

- C. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
- D. Firefighters' Two-Way Telephone Communication Service: Provide telephone jack in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in Division 28 fire alarm system sections.
- E. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.
- F. Hall Push-Button Stations: Provide one hall push-button station at each landing.
 - 1. Provide units with flat satin stainless steel faceplate for mounting with body of unit recessed in wall.
 - 2. Equip units with buttons for calling elevator and for indicating desired direction of travel.
 - a. Provide for connecting units to building security access system so a card reader can be used to register calls.
 - 3. Provide telephone jack in each unit for firefighters' two-way telephone communication service specified in Division 28 fire alarm system sections.
- G. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide the following:
 - 1. Units mounted in both jambs of entrance frame.
- H. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
- I. Hall Position Indicators: Provide illuminated, digital-display-type position indicators, located above each hoistway entrance at ground floor. Provide units with flat faceplate and with body of unit recessed in wall.
 - 1. Provide units with flat faceplate for mounting and with body of unit recessed in wall.
 - 2. Integrate ground-floor hall lanterns with hall position indicators.
- J. Standby Power Elevator Selector Switches: Provide switches, as required by ASME A17.1/CSA B44, where indicated. Adjacent to switches, provide illuminated signal that indicates when normal power supply has failed. For each elevator, provide illuminated signals that indicate when they are operational and when they are at the designated emergency return level with doors open.
- K. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire, elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

2.10 FINISH MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A1008/A1008M, commercial steel, Type B, exposed, matte finish.
- B. Hot-Rolled Steel Sheet: ASTM A1011/A1011M, commercial steel, Type B, pickled.
- C. Stainless Steel Sheet: ASTM A240/A240M, Type 304.
- D. Stainless Steel Bars: ASTM A276, Type 304.
- E. Stainless Steel Tubing: ASTM A554, Grade MT 304.
- F. Aluminum Extrusions: ASTM B221 (ASTM B221M), Alloy 6063.
- G. Plastic Laminate: High-pressure type complying with NEMA LD 3, Type HGS for flat applications and Type BKV for panel backing.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work. Examine hoistways, hoistway openings, and pits as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions.
- B. Welded Construction: Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- C. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
- D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.
- E. Alignment: Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- F. Leveling Tolerance: 1/8 inch, up or down, regardless of load and travel direction.

- G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- H. Plywood Subfloor:
 - 1. Secure to steel cab deck with screws at 6 inches on center at plywood panel edges and 12 inches on center at the panel field. Screws to penetrate the steel deck minimum of 3/4 inch. Apply beads of exterior grade adhesive along edges and at 12 inches on center at the panel field.
 - a. Screws to be Type 304 stainless steel or steel with hot-dip zinc coating complying with ASTM A153/A153M or ASTM F2329/F2329M.
 - b. Use steel drill screws, with self-tapping tip for penetrating cabs steel deck, that comply with ASTM C954.
 - c. Space long plywood joints 1/8 to 1/4 inch apart.
 - d. Space short joints 1/16 to 1/8 inch apart.
- I. Locate hall signal equipment for elevators as follows unless otherwise indicated:
 - 1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
 - 2. Place hall lanterns either above or beside each hoistway entrance.
 - 3. Mount hall lanterns at a minimum of 72 inches above finished floor.

3.3 FIELD QUALITY CONTROL

- A. 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.
- B. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times that tests are to be performed on elevators.

3.4 PROTECTION

- A. Temporary Use: Comply with the following requirements for elevator used for construction purposes:
 - 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
 - 2. Provide strippable protective film on entrance and car doors and frames.
 - 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
 - 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
 - 5. Do not load elevators beyond their rated weight capacity.
 - 6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleanup, and adjustment as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
 - 7. 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.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).
- B. Check operation of each elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

3.6 MAINTENANCE SERVICE

- A. 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 at rated speed and capacity. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
 - 1. Perform maintenance during normal working hours.
 - 2. Perform emergency callback service during normal working hours with response time of two hours or less.

END OF SECTION