ADDENDUM NO. 5

September 23, 2020

Montgomery County Shared Services Facility

This addendum is hereby included in and made a part of the Contract. All requirements of the original Bid Documents shall remain in force except as noted by this addendum.

The purpose of this addendum provided by LiRo Engineers, Inc. is to provide bidders with information on the following items:

Item # 1 Drawing Referenced : Specification Reference : 011000

REPLACE: With update summary of work attached. Please note that the change is in regards to the fueling canopy, canopy foundations, tank foundations, fueling island, concrete area surrounding the tanks, tank area bollard, and concrete area under the canopy. This work has been removed from the GC scope of work and added to the PC scope of work.

Item # 2 Drawing Referenced : Specification Reference : 131200

REMOVE: Specification from GC spec book **ADD**: Specification to PC spec book **REPLACE:** With update spec attached.

Item # 3 Drawing Referenced : Specification Reference : 033000

ADD: Specification to PC spec book. Refer to attached. (note the specification is part of the GC and PC spec book)

Item # 4 Drawing Referenced : C100 Specification Reference :

REPLACE: With attached drawing.

SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Work by Owner.
 - 4. Multiple Work Packages.
 - 5. Owner-furnished products.
 - 6. Access to site.
 - 7. Work restrictions.
 - 8. Specification and Drawing conventions.

1.3 DEFINITIONS

A. Work Package: A group of specifications, drawings, and schedules prepared by the design team to describe a portion of the Project Work for pricing, permitting, and construction.

1.4 **PROJECT INFORMATION**

- A. Project Identification: Montgomery County Shared Facility
 - 1. Project Location: 115 Park Drive, Glen Canal View Business Park, Fultonville, NY
- B. Owner: Montgomery County
- C. Design Consultant: The LiRo Group

1.5 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and includes, but is not limited to, the following as part of the base bid:
 - 1. Project scope is for the construction of an approximately 42,250 gross square foot building consisting of a garage facility, office space and other Work indicated in the

Contract Documents. The garage facility includes five (5) maintenance bays, a stock room, tire room, lube room, print shop, storage, locker rooms, 2 bay indoor parking garage, and other support spaces. The pre-engineered building includes day lighting features that are integrated into the roof framing utilizing supplemental steel framing. The foundation and slab is poured concrete. Exterior wall construction consists of a combination of concrete block, insulated metal panels, and brick. Building roof is a standing seam insulated metal panel roofing system. Office space consists of two (2) main lobby's, conference rooms. toilet rooms, storage, and other support spaces. Ceilings systems consist of suspended gypsum wall board, suspended ACT, tectum ceiling panels, and tapered wood veneer panels.

Site scope includes the demolition of the existing site, underground utility distribution, landscaping, concrete, asphalt, fencing, and curbing. Total site area is approximately 19.9 acres. Site utilities includes distribution of domestic water, storm, sanitary, and natural gas. Sanitary from the garage area is to be discharged through an oil water separator provided by the site contractor. Finish grade construction includes a combination of asphalt, gravel, and concrete. Additionally, concrete pads are specified for HVAC equipment and fueling equipment. Storm water management includes a retention pond on the north side of the facility. Additional site improvements include a dry swale.

- 2. Mechanical HVAC systems include a variable refrigerant flow system within the office area to accommodate heating and cooling of these spaces and a dedicated out door air heat recovery gas fired with DX cooling unit to accommodate ventilation of these spaces. Within the garage and other industrial type spaces there is no cooling. Heating is provided by a combination of overhead infrared gas fired heaters, gas fired unit heaters, and electric unit heaters. Ventilation is provided by a dedicated outdoor air heat recovery gas fired unit. Various exhaust fans are included for exhaust of toilet rooms, locker rooms, and to remove other contaminants. Building controls is provided primarily by factory installed equipment controls and a central building management system that enables, disables, monitors, and provides set points.
- 3. Plumbing and fire protection systems include domestic cold and hot water, underground sanitary, vent piping, and natural gas piping. Catch basins and floor drains provide drainage within the garage area. Sanitary drainage from the garage is discharged through an oil water separator provided by the civil contractor. Two water lines enter the building within the utility room, one for domestic water and the other for fire protection. A RPZ is installed within the building to provide backflow prevention of the domestic water line and a DCDA is installed to provide backflow protection of the fire protection line. Domestic hot water is provided by a gas fired water heater. Plumbing fixtures include lavatories, water closets, urinals, showers, mop sinks, and water coolers. Natural gas is distributed throughout the building to overhead gas fired infrared heaters, unit heaters, and air handling equipment.

Additionally, plumbing scope of work includes all fueling, lubrication, and compressed air systems. Fueling includes a gasoline and diesel aboveground double wall tanks. Fuel is distributed from the tanks to two island mounted duel fuel dispensers. A fuel system control panel distributes power and communication to the fueling system. Lubrication systems include distribution of two types of engine oil, hydraulic oil, windshield washer fluid, used oil, and used coolant to overhead fluid reels. Fluids are stored in double wall aboveground tanks.

- 4. Electrical systems include exterior pad mounted transformer furnished by the utility and installed by the electrical contractor, interior switchgear, power distribution, lighting, fire alarm, and security. Power distribution includes power to HVAC equipment, doors, maintenance equipment, plumbing equipment, and exterior building illumination. Lighting systems includes recessed, pendant, surface, wall mounted, pole, high bay fixtures, and lighting controls. Additionally, site electrical includes lighting, flag pole illumination, power distribution, and vehicle charging.
- B. Type of Contract:
 - 1. Project will be constructed under coordinated, concurrent multiple contracts.
 - 2. General Contract:
 - a. The following scope items are but not limited to the following items, refer to the drawings for additional information:
 - 1) All work shown on G, C, S, A, and Q series drawings
 - a) Fueling tank foundations shown on structural drawings (D5 and C5 on S103), canopy foundations (delegated design), tank area concrete pad (C-100), fueling tank bollards (C-100), fueling island (C-100), and concrete area under the canopy (C-100) are excluded.
 - 2) Pre-engineered metal building
 - 3) Doors and door hardware including exterior and interior garage doors
 - 4) Building finishes
 - 5) Concrete foundations and slabs
 - 6) Insulated metal panel façade
 - 7) Masonry
 - 8) Roofing materials
 - 9) Wall louvers
 - 10) Glazing
 - 11) Maintenance storage equipment
 - 12) Maintenance equipment including vehicle lifts, portable equipment, jacks, benches, metal fabrication equipment, and cranes
 - 13) Relocation of maintenance equipment identified on Q series drawings
 - 14) Interior and exterior building signage.
 - 15) Fire stopping for all trades
 - 16) Concrete pads and footings for all trades
 - 17) Ceiling assemblies
 - 18) Building insulation
 - 19) Oil water separator
 - 20) Site demolition and clearing
 - 21) Backfill and compaction
 - 22) Clear and grub
 - 23) Dispose of excavated material
 - 24) Concrete
 - 25) Asphalt
 - 26) Gravel
 - 27) Fencing
 - 28) Storm water control
 - 29) Utility distribution
 - 30) Bollards

- a) Excluding tank area bollard as shown on C-100
- 31) Silt fence and erosion control
- 32) Landscaping
- 33) Painted lines
- 34) Excavation for footings
- 3. Mechanical Contract:
 - a. The following scope items are but not limited to the following items, refer to the drawings for additional information:
 - 1) All work shown on H series drawings
 - 2) Overhead gas fired infrared heaters
 - 3) Gas and electric unit heaters
 - 4) Variable refrigerant flow heat and cooling system.
 - 5) Dedicated outside air heat recovery ventilation units.
 - 6) Overhead vehicle exhaust extraction system
 - 7) Gas detection system.
 - 8) Building automation and controls
 - 9) Low voltage power distribution to accommodate system controls
 - 10) Interior and exterior ductwork and accessories
 - 11) Exhaust fans
 - 12) Insulation
 - 13) Earthwork and trenching
- 4. Electrical Contract:
 - a. The following scope items are but not limited to the following items, refer to the drawings for additional information:
 - 1) All work shown on E and FA series drawings
 - 2) Building and site lighting
 - 3) Power distribution including power to signage, access control, HVAC equipment, maintenance equipment shown on Q series drawings, overhead garage doors, etc.
 - 4) Cameras are furnished and installed by others, electrical to install conduits and CAT6 cables.
 - 5) Install power transformer and meter furnished by utility company
 - 6) Access control
 - 7) Fire alarm
 - 8) Power to maintenance equipment shown on Q series drawings.
 - 9) Conduit and cabling
 - 10) Earthwork and trenching
 - 11) Electric snowmelt at wash bay exterior doors
- 5. Plumbing Contract:
 - a. The following scope items are but not limited to the following items, refer to the drawings for additional information:
 - 1) All work shown on P, FP, and D series drawings.
 - 2) All work related to the fueling system shown on the S and C drawings including- tank foundations shown on structural drawings C5 and D5 on S-

103), canopy foundations (delegated design), tank area concrete pad (C-100), fueling island (C-100), tank area bollard (C-100), and concrete area under the canopy (C-100) are included on the Plumbing contract.

- 3) Natural gas distribution
- 4) Domestic cold and hot water distribution.
- 5) Sanitary and vent distribution
- 6) Fluid lubrication storage and distribution to overhead reals
- 7) Relocation of existing compressor
- 8) Compressed air distribution
- 9) Fueling system including tanks, piping, power, controls, dispensers, pumps, fueling control panel, site trenching and earth work, canopy fire suppression, fueling canopy, canopy foundations, tank foundations and pad, fueling island, fueling concrete area under the canopy, and all fueling area related site work shown on civil drawings.
- 10) Fire protection system
- 11) Backflow prevention devices
- 12) Plumbing fixtures
- 13) Piping and insulation
- 14) Earthwork and trenching
- 15) Water heater

1.6 WORK BY OWNER

- A. Cooperate fully with Owner, so work may be carried out smoothly, without interfering with or delaying Work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.
- B. Concurrent Work: Owner will perform the following construction operations at Project site. Those operations will be conducted simultaneously with Work under this Contract.
 - 1. Furniture, fixtures, and equipment moving & installation excluding maintenance equipment as shown on Q drawings. Maintenance equipment relocation shown on Q drawings to be provided by general contractor.

1.7 MULTIPLE WORK PACKAGES

- A. Construction Documents for this Project will be issued in a series of Work Packages, each defining the Work under individual Contracts. Coordinate the Work under this Contract with separate contracts defined by other work packages. Work Packages consist of the following:
 - 1. Multiple Contract Project consisting of the following prime contracts:
 - a. General Building Construction.
 - b. Plumbing Construction.
 - c. Mechanical Construction.
 - d. Electrical Construction.

- 1.8 ALTERNATES
 - A. The following identifies the work to be included as part of the add alternates
 - B. General contract
 - 1. GC-1- Cold storage building
 - a. 11,200 cold storage bldg.
 - b. Chain link fence (907 feet)
 - c. Swing gates (2 location, each location with two 12' wide gates)
 - d. Gravel Parking (60,142 sf)
 - 2. GC-2- Platform lift
 - a. Refer to Q series drawings.
 - C. Mechanical contract
 - 1. None
 - D. Electrical contract
 - 1. EC-1 Cold storage building
 - a. Power and lighting associated with the cold storage building. Refer to site electrical drawings.
 - 2. EC-2- Generator
 - a. Work associated with providing emergency generator. Refer to electrical drawings.
 - E. Plumbing contract
 - 1. None

1.9 ACCESS TO SITE

- A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.
- B. Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.

1.10 WORK RESTRICTIONS

- A. Comply with restrictions on construction operations.
 - 1. Comply with limitations on use of public streets, work on public streets, rights of way, and other requirements of authorities having jurisdiction.
- B. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7:00 a.m. to 5:30 p.m., Monday through Friday, unless otherwise indicated.
 - 1. Weekend Hours: Same as On-Site Work Hours. Provide 48 hours notice to Owner, carbon copying the Architect, in writing, prior to proposed weekend work hours. Work shall only be allowed after written approval by the Owner is provided to the Contractor>.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- D. Restricted Substances: Use of tobacco products and other controlled substances within the existing building or on Project site is not permitted.
- E. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- F. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 - 1. Maintain list of approved screened personnel with Owner and/or Owner's representative.

1.11 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
 - 1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 - 2. Text Color: Text used in the Specifications, including units of measure, manufacturer and product names, and other text may appear in multiple colors or underlined as part of a hyperlink; no emphasis is implied by text with these characteristics.
 - 3. Hypertext: Text used in the Specifications may contain hyperlinks. Hyperlinks may allow for access to linked information that is not residing in the Specifications. Unless otherwise indicated, linked information is not part of the Contract Documents.
 - 4. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

- B. Division 00 Contracting Requirements: General provisions of the Contract, including General and Supplementary Conditions, apply to all Sections of the Specifications.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
 - 1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 - 2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard.
 - 3. Keynoting: Materials and products are identified by reference keynotes referencing Specification Section numbers found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with fly ash; materials subject to compliance with requirements.
- B. W/C Ratio: The ratio by weight of water to cementitious materials.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
- 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. Submit plans and elevations at 1/4" = 1'-0" scale for all areas including CMU walls.
- E. Material Certificates: For each of the following, signed by manufacturers:
 - 1. Cementitious materials.
 - 2. Admixtures.
 - 3. Steel reinforcement and accessories.
 - 4. Curing compounds.
 - 5. Adhesives.
 - 6. Vapor retarders.
 - 7. Joint-filler strips.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel having a minimum of 5 years of documents experience with projects of similar scope and size.
- 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 according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. 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. Mockups: Cast concrete slab-on-grade and formed-surface panels to demonstrate typical joints, surface finish, texture, tolerances, floor treatments, and standard of workmanship.
 - 1. Build panel approximately 100 sq. ft. for slab-on-grade and 50 sq. ft. for formed surface in the location indicated or, if not indicated, as directed by Architect.
 - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on concrete mixtures. Testing must be done by an agency qualified as noted above. The testing must be completed within the prior 12 months of submission.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

1.7 FIELD CONDITIONS

- A. 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.
- B. Hot-Weather Placement: Comply with ACI 301 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.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

- A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301.
 - 2. ACI 117.

2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
- 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 strips, 3/4 by 3/4 inch, minimum.
- E. Form-Release Agent: Commercially formulated form-release agent that does not bond with, stain, or adversely affect concrete surfaces and does not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- F. Form Ties: Factory-fabricated, removable or snap-off glass-fiber-reinforced plastic or metal form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, leave holes no larger than 1 inch in diameter in concrete surface.

2.3 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed bars, epoxy coated, with less than 2 percent damaged coating in each 12-inch bar length.
- C. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from asdrawn steel wire into flat sheets.

2.4 REINFORCEMENT ACCESSORIES

- A. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60, plain-steel bars, ASTM A 775/A 775M epoxy coated.
- B. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.
- C. 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 or plastic 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. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire 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, and obtain admixtures from single source from single manufacturer.
- B. Cementitious Materials:
 - 1. Portland Cement: ASTM C 150/C 150M, Type I Type II Type I/II, gray.
 - 2. Fly Ash: ASTM C 618, Class F.
- C. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
 - 1. Maximum Coarse-Aggregate Size: See mix designs.
 - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- D. Air-Entraining Admixture: ASTM C 260/C 260M.
- E. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Mid-Range Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - a. Use a mid-range water reducing admixture in all redi-mix concrete unless using a high-range water reducing admixture or super plasticizer.
 - 2. High-Range, Water-Reducing Admixture or Super Plasticizer: ASTM C 494/C 494M, Type F.
 - a. Use and dose as required for higher slump and for pumping. See additional requirements herein.
 - 3. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - a. Use only with permission from the Owner's Representative.
- F. Water: ASTM C 94/C 94M.

2.6 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A. Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - a. R Fortifiber Building Systems Group; Moistop Ultra 15.
 - b. Raven Industries Inc.; Vapor Block 15.
 - c. Stego Industries, LLC; Stego Wrap 15 mil Class A.

2.7 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.
- B. Wet Curing Blanket: A rolled sheet product consisting of an impermeable layer over an absorptive layer to hold moisture against the slab.
 - 1. Ultracure.
 - 2. Hydracure.
 - 3. Conkure.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
 - b. Kaufman Products, Inc.; Thinfilm 420.
 - c. L&M Construction Chemicals, Inc.; L&M Cure R.

2.8 RELATED MATERIALS

A. Expansion and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.

2.9 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Fly ash may be used to reduce the total amount of portland cement, which would otherwise be used, by up to 20 percent.
- C. Admixtures: Use admixtures according to manufacturer's written instructions.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS

A. Footings and Foundation Walls: Normal-weight concrete.

CAST-IN-PLACE CONCRETE

- 1. Minimum Compressive Strength: 4000 psi at 28 days.
- 2. Nominal maximum aggregate size: 1-1/2 inches.
- 3. Slump with a mid-range water reducer or a low dose of high-range water reducer or super plasticizer: 5 inches, plus or minus 1 inch.
- 4. Slump with a full dose of a high-range water reducer or super plasticizer: 7 inches, plus or minus 1 inch.
- 5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery.
- B. Slabs-on-Grade and Slabs on Metal Deck: Normal-weight concrete.
 - 1. Minimum Compressive Strength: 4500 psi at 28 days.
 - 1. Nominal maximum aggregate size: 1-inch.
 - 2. Slump with a mid-range water reducer or a low dose of high-range water reducer or super plasticizer: 5 inches, plus or minus 1 inch.
 - 3. Slump with a full dose of a high-range water reducer or super plasticizer: 7 inches, plus or minus 1 inch.
 - 4. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for exterior slabs without a steel trowel finish.
 - 5. Air Content: Do not allow air content of interior trowel-finished floors to exceed 3 percent. Do not use an air entrainment admixture for this application.

2.11 FABRICATING REINFORCEMENT

A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish computer generated batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
 - 2. Longer delivery times may be allowed but only with the use of a retarding admixture and only when approved in writing from the Engineer of Record.

2.13 CONCRETE ANCHORS

- A. Expansion stud anchors: Hilti Kwik-Bolt III or Kwik-Bolt TZ, Hot-Dip Galvanized UNO, or approved equivalent.
- B. Threaded rod stud anchors: Hilti HIT-HY 200 SafeSet Adhesive, OAE, or approved equivalent.

- C. Threaded rod stud anchors in cold weather applications: Hilti HIT-ICE SafeSet Adhesive, OAE, or approved equivalent.
- D. Threaded rod stud anchors in hollow and solid masonry: Hilti HIT-HY 270 Adhesive, OAE, or approved equivalent.

PART 3 - EXECUTION

3.1 FORMWORK INSTALLATION

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- 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.
 - 2. Class B, 1/4 inch for rough-formed finished surfaces.
- 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.
 - 1. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. 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. Chamfer exterior corners and edges of permanently exposed concrete where noted on the contract 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 ITEM INSTALLATION

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 - 2. Support all embedded items in advance of concrete placement. Do not "wet-stick" embedded items into plastic concrete.

3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations, and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that support weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material are not acceptable for exposed surfaces. Apply new form-release agent.

3.4 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 and/or adhesive and sealants.

3.5 STEEL REINFORCEMENT INSTALLATION

- A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement prior to concrete placement. Do not "wet-stick" reinforcement into plastic concrete. 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.
- F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Owner's Representative.
 - 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. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.

- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. Sawed Joints: Form contraction joints with early entry power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch-wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface. Cut joints no later than 18 hours after concrete placement.
- 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. 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 Section 079200 "Joint Sealants," are indicated.
 - 2. 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.

3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Owner's Representative, and only when mix water is documented on a computer generated batch ticket as being withheld at the batch plan. Do not exceed the total amount of water in the approved mix design.
 - 1. Do not add water to concrete after adding a low or full dose of high-range water-reducing admixtures to concrete.
- C. 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.

- D. 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.

3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with the holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
 - 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, or to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed-finished as-cast concrete where indicated:
 - 1. Smooth-Rubbed Finish: Remove forms, preferably after 24 hours but not later than 24 hours. Immediately moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and smooth texture. Do not apply supplemental cement other than that created by the rubbing process unless approved in advance through a mock-up process. Provide sufficient labor to complete all rubbing in one day. Grinding or parging the concrete surface later is not acceptable. Failure to perform this work properly and on time is cause for rejection and replacement of the work.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a steel trowel to level, straight,

and square lines. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
 - 1. Apply float finish to surfaces indicated and to receive trowel finish.
- 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 indicated exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 - 2. Finish surfaces to the following tolerances, in accordance with ASTM E1155, for a randomly trafficked floor surface:
 - a. Slabs on Ground:
 - 1) 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, $F_L 17$.
 - b. Suspended Slabs:
 - 1) Specified overall values of flatness, $F_F 35$; and of levelness, $F_L 20$; with minimum local values of flatness, $F_F 24$; and of levelness, $F_L 15$.
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated where ceramic or quarry tile is to be installed by either thickset or thinset method. While concrete is still plastic, slightly scarify surface with a fine broom.
 - 1. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- 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 Owner's Representative before application.

3.10 MISCELLANEOUS CONCRETE ITEM INSTALLATION

- 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 inplace construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
 - 1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 - 2. Construct concrete bases 4 inches high unless otherwise indicated, and extend base not less than 6 inches in each direction beyond the maximum dimensions of supported equipment unless otherwise indicated or unless required for seismic anchor support.
 - 3. Minimum Compressive Strength: match supporting concrete.
 - 4. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 18-inch centers around the full perimeter of concrete base.
 - 5. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 6. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.11 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for remainder of curing period.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- D. Cure concrete according to ACI 308.1, by the following methods:

- 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
- 2. Wet Curing Blankets: Cover concrete surfaces with wet curing blankets for curing concrete, placed in widest practicable width, with sides and ends lapped, and in conformance with the manufacturer's recommendations. 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 wet curing blankets to cure the following:
 - 1) Concrete slabs to receive floor coverings. Concrete to receive urethane concrete cement composition flooring should be water cured for a minimum of 28 days.
 - 2) Concrete surfaces to receive penetrating liquid floor treatments.
- 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - a. Removal: After curing period has elapsed, at exposed concrete surfaces, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
 - b. Curing Compounds may be used to cure the following:
 - 1) Exterior concrete slabs when approved by the Owner's Representative.
 - 2) Concrete footings, walls, columns, beams, and other building elements.

3.12 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.

3.13 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Owner's Representative. Remove and replace concrete that cannot be repaired and patched to Owner's Representative's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of 1 part portland cement to 2-1/2 parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar matches surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
 - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Owner's Representative.
- D. 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. Repair Mortar below surfaces to receive urethane cement composition flooring should be of a type recommended and manufactured by the Resinous flooring manufacturer. For patching and Pitching the materials should be Dex-O-Tex High Strength Mortar.

3.14 CONCRETE ANCHOR INSTALLATION

- A. Identify location of embedded items such as reinforcing steel, stressing tendons, conduit, heating tubes, etc. prior to drilling holes. Coordinate with respective trades if any apparent conflict exists. Exercise care in coring and drilling to avoid damaging any existing embedded items. If embedded items are encountered, stop drilling and contact Engineer immediately. Any offsets or relocations of anchors must be approved by Engineer. This contractor is responsible for the cost of any required repairs including engineering costs.
- B. Drill holes of proper diameter and depth in accordance with manufacturer's published design information for that specific anchor. Use only equipment approved by anchor manufacturer. All holes shall be perpendicular to the concrete surface unless shown otherwise on structural plans.
- C. Do not drill holes until base material has achieved full design strength.
- D. Installation of all post installed anchor products shall be conducted in strict accordance with the Manufacturer's Published Installation Instructions (MPII).Use hammer drills for adhesive anchors, or SafeSet drill for Hilti anchors (unless noted otherwise).
- E. All adhesive anchor installations shall be conducted by a certified Adhesive Anchor Installer as certified by ACI/CSRI per ACI 318-11 D.9.2.2. Current AAI Certificated must be submitted to the Engineer of Record for approval prior to commencement of any adhesive anchor installations.
- F. Clean out holes, properly prepare substrate, and install anchors in accordance with manufacturer's instructions. Proper tools must be on job site.
- G. For adhesive anchors, maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer. Verify that base material temperature is within manufacturer limits. Do not install adhesive anchors if any criteria do not fall within manufacturer's limits. Ensure that bore holes and anchors are free of dust, standing water, ice, debris, grease, oil, dirt and other foreign matter.
- H. For adhesive anchors, protect anchors with approved fire-resistive materials, or spray-on fireproofing when anchors are attached to fire-resistive construction. Refer to ICC-ES Evaluation Service Reports (ESR's) Conditions of Use for applicability.

3.15 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector and qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Inspections:
 - 1. Steel reinforcement placement.

- 2. Headed bolts and studs.
- 3. Verification of use of required design mixture.
- 4. Concrete placement, including conveying and depositing.
- 5. Curing procedures and maintenance of curing temperature.
- C. 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 exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - 2. Slump: ASTM C 143/C 143M; one test at point of truck discharge, for each truck delivery to the site, and for each composite sample. Perform additional tests when concrete consistency appears to change. Concrete with slump in excess of the specified maximum shall not be placed on the project.
 - 3. 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. Test at truck discharge for acceptance based on specification. Also test at the end of the pump hose for pumped concrete. Concrete with air content outside of the specified limits shall not be placed on the project.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below or 80 deg F and above, and one test for each composite sample.
 - 5. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure six standard 6x12 cylinder specimens or eight 4x8 cylinder specimens for each composite sample.
 - 6. Compressive-Strength Tests: ASTM C 39/C 39M; test two laboratory-cured specimens at 7 days. Test two 6x12 specimens, or three 4x8 specimens at 28 days. Reserve the remaining specimens and test at 56 days if the 28 day test result are below the specified requirements.
 - a. A compressive-strength test shall be the average compressive strength from each set of specimens obtained from same composite sample and tested at age indicated.
 - 7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 - 8. Test results shall be reported in writing to Owner's Representative, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.

- 9. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Owner's Representative. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
- 10. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- 11. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION 033000

SECTION 131200

FUEL ISLAND CANOPY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Freestanding, pre-engineered metal canopies including concrete foundations, steel framing, metal roof, roof drains and leaders, fascia components, and metal ceiling and accessories.
- 1.2 RELATED SECTIONS
 - A. Division 11 Equipment: Fuel and Fluid Management System.
 - B. Division 11 Equipment: Fueling System Equipment.
 - C. Division 26 Electrical.

1.3 REFERENCES

- A. American Institute of Steel Construction, Inc. (AISC): AISC 360 Specification for Structural Steel Buildings (copyrighted by AISC, ANSI approved).
- B. American Society of Civil Engineers (ASCE): ASCE 7-10 Minimum Design Loads for Buildings and Other Structures (copyrighted by ASCE, ANSI approved).
- C. American Welding Society (AWS): AWS D1.1 Structural Welding Code Steel (copyrighted by AWS, ANSI approved).
- D. American Concrete Institute (ACI) ACI 318 Building Code Requirements for Structural Concrete (copyrighted by ACI)
- E. National Fire Protection Association (NFPA): NFPA 70 National Electrical Code (copyrighted by NFPA, ANSI approved) hereinafter referred to as NEC.
- F. ASTM International (ASTM):
 - 1. ASTM A 36/A 36M Standard Specification for Structural Steel.
 - 2. ASTM F 1554 (GR36) Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
 - 3. ASTM A 325/A 325M Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi Minimum Tensile Strength.
 - 4. ASTM A 500/A 500M Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes.
 - 5. ASTM A 572/A 572M Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.
 - 6. ASTM A 653/A 653 M Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvanealed) by the Hot-Dip Process.
 - 7. ASTM C 1107 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).

G. National Association of Architectural Metal Manufacturers (NAAMM): NAAMM MFM - Metal Finishes Manual.

1.4 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide pre-engineered canopies and reinforced concrete foundations capable of withstanding the effects of gravity and lateral loads and the following loads and stresses per IBC 2015 with 2017 New York State Amendments:
 - 1. Minimum design wind load per ASCE 7-10, CH. 26-30.
 - 2. Minimum design snow load per ASCE 7-10, CH. 7.
 - 3. Minimum design seismic criteria per ASCE 7-10, CH. 11 13.
 - 4. Load combinations per ASCE 7-10, CH 2.
 - 5. Live load deflections shall be limited to H/240.
 - 6. In accordance with minimum recommendations provided in the geotechnical investigation report prepared by Terracon Consultants-NY, Inc dated October 1, 2019.
 - Minimum depth of footings is 4'-0" below finish grade for frost protection.

Minimum concrete compressive strength 4,000 psi at 28 days.

- B. Thermal Movements: Provide pre-engineered canopies that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 - 1. Temperature Change (Range): 120 degrees F (67 degrees C), ambient; 180 degrees F (100 degrees C), material surfaces.

1.5 SUBMITTALS

- A. Shop Drawings: For the following metal canopy system components, including all design documents. Include plans, elevations, sections, details, and attachments to other work:
 - 1. Drawings shall show specific application to this Project. Submit all required drawings in one submission, except as noted.
 - a. Erection Drawings: Manufacturer's complete erection drawings. Indicate manufacturer's identification marking for the components.
 - b. Manufacturer's drawings showing base plate dimensions and foundation loads for all columns and /or rigid frames.
 - 1) Manufacturer's standard sheets showing loads or details for a multiple range of building spans, heights, and loadings will not be accepted.
 - c. Foundation drawings showing dimensions and elevations of all piers, walls, and footings required.
 - d. Anchor-Bolt Plans: Submit anchor-bolt plans and templates before foundation work begins. Include location, diameter, and projection of anchor bolts required to attach all columns and/or rigid frames to foundation. Indicate column reactions at each location.
 - e. Structural-Framing Drawings: Show complete fabrication of primary and secondary framing; include provisions for openings. Indicate welds and bolted connections, distinguishing between shop and field applications. Include transverse cross-sections.
 - f. Metal Canopy Panel Layout Drawings: Show layouts of metal panels including methods of support. Include details of edge conditions, joints, panel profiles, corners, anchorages, trim, flashings, closures, and special details. Distinguish

between factory- and field-assembled work; show locations of exposed fasteners.

- g. Anchor bolt and tie rod details.
- h. Accessory Drawings: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:8).
 - 1) Flashing and trim.
 - 2) Gutters.
 - 3) Downspouts.
- B. Samples for Verification: For each type of exposed finish required, prepared on Samples of sizes indicated below:
 - 1. Metal Panels: Nominal 12 inches (300 mm) long by actual panel width. Include fasteners, closures, and other exposed panel accessories.
 - 2. Flashing and Trim: Nominal 12 inches (300 mm) long. Include fasteners and other exposed accessories.
 - 3. Accessories: Nominal 12-inch- (300-mm-) long Samples for each type of accessory.
- C. Delegated-Design Submittal: For metal building and foundation systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Product Data: Manufacturer's catalog sheets, specifications, and installation instructions for all components.
- E. Quality Control Submittals:
 - 1. Design Calculations: Manufacturer's design calculations signed and sealed by a professional engineer who is legally qualified to practice in jurisdiction where Project is located, for the entire canopy structure and foundation.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for insulation and vapor-retarder facings. Include reports for thermal resistance, fire-test-response characteristics, water-vapor transmission, and water absorption.
- G. Field quality-control reports.
- H. Warranties: Sample of special warranties.
- I. Maintenance Data: For metal panel finishes to include in maintenance manuals.
- 1.6 CANOPY DESIGN REQUIREMENTS
 - A. The fuel island canopy and associated foundations shall be designed by the engineering staff of the company producing the canopy
 - B. The design shall be done by a professional engineer who is legally qualified to practice in jurisdiction where Project is located. All drawings and product data shall bear the seal of the professional engineer.
 - C. Comply with the applicable provisions of the New York Uniform CodeCode, the ICC International Fire Code, the New York Fire Prevention Code, referenced codes and

regulations, and amendments.

- D. Foundations shall be designed per provided geotechnical report.
- E. Anchor bolts shall be designed per ACI 318, Appendix D.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in engineering and manufacturing preengineered canopies with a minimum documented experience of twenty years and with a quality assurance program utilizing a quality inspection for each system.
 - 1. Engineering Responsibility: Preparation of comprehensive engineering analysis and Shop Drawings by a professional engineer who is legally qualified to practice in jurisdiction where Project is located.
- B. Erector Qualifications: An experienced erector who specializes in erecting and installing work similar in material, design, and extent to that indicated for this Project and who is acceptable to manufacturer.
- C. Welding certificates.
- D. Welding: Qualify procedures and personnel according to the following:
 - 1. Welding shall be in accordance with AWS D1.1 (with E70XX electrodes).
 - 2. Structural shop welding shall be done by certified welders.
 - 3. Steel shop connections shall be welded and field connections shall be bolted unless otherwise noted on the Drawings. Shop welds may be changed to field welds with the approval of the project engineer.
 - 4. Slag shall be cleaned from welds and inspected. Steel shall be painted with red oxide rust-inhibitive primer.
- E. Structural Steel: Comply with AISC 360, "Specification for Structural Steel Buildings," for design requirements and allowable stresses.
- F. Cold-Formed Steel: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" for design requirements and allowable stresses.
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NEC, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- H. Source Limitations: Obtain pre-engineered metal canopy through one source from a single manufacturer who shall manufacture and install the canopy.
- I. Product Options:
 - Information on the Drawings and in the 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. Do not modify intended aesthetic effects, as judged solely by the Architect, except with the Architect's approval. If modifications are proposed, submit comprehensive explanatory data to the Architect for review.

2. The Drawings indicate size, profiles, and dimensional requirements of pre-engineered metal canopies and are based on the specific system indicated. Do not modify intended aesthetic effects, as judged solely by the Architect, except with the Architect's approval.

If modifications are proposed, submit comprehensive explanatory data to the Architect for review.

- J. Coordination
 - 1. The Contractor shall conduct site meetings to verify project requirements, substrate conditions, utility connections, manufacturer's drawings and installation instructions. Comply with provisions of the General Conditions Article 4.11.7: Project Schedule on project meetings.
 - 2. The contractor shall prepare for and pour the concrete footers for the pre-engineered metal canopies. Manufacturer shall furnish recommended footing drawings and prints and rebar details for concrete footings, as well as provide anchor bolts to be embedded in concrete footer. Such items shall be delivered to project site in time for installation.
- K. Preinstallation Conference: Conduct conference at Project site.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, sheets, 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. Store products in manufacturer's unopened packaging until ready for installation.
- D. Protect components and accessories from corrosion, deformation, damage, and deterioration when stored at job site. Keep materials free from dirt and foreign matter.

1.9 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when weather conditions permit metal panels to be installed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: The Contractor shall verify location and elevation of footings relative to finished grade, columns, and other construction contiguous with pre-engineered metal canopies by field measurements before fabrication and indicate measurements on shop drawings.

1.10 COORDINATION

A. Coordinate sizes and locations of concrete foundations and casting of anchor-bolt inserts into foundation walls and footings. Concrete, reinforcement, and formwork requirements are specified in Section 033000 "Cast-in-Place Concrete."

B. Coordinate metal panel assemblies with rain drainage work, flashing, trim, and construction of supports and other adjoining work to provide a leak proof, secure, and noncorrosive installation.

1.11 WARRANTY

A. Manufacturer shall warrantee the products it manufacturers to be free of defects in materials, leaks, and workmanship for 1 year from date of shipment.

PART 2 - PRODUCTS

2.1 FUEL ISLAND CANOPY

- A. Acceptable Manufacturer: Subject to compliance with requirements, provide fuel island canopy by one of the following:
 - 1. Austin Mohawk and Company, Inc., Utica, NY.
 - 2. Shelters Direct, Laurel, MD.
 - 3. TFC Canopy, Garrett, IN.
 - 4. Or approved equal.
- B. Substitutions: Requests for substitutions will be considered in accordance with provisions of the General Conditions.

2.2 MATERIALS

- A. Structural Steel:
 - 1. Material and work shall conform to the latest AISC 360.
 - 2. Wide flange I-beam shall conform to ASTM A 572/A 572M GR.50, Fy ' 50 ksi. Other rolled sections shall conform to ASTM A 36/A 36M, Fy ' 36 ksi.
 - 3. Square and rectangular tubing shall conform to ASTM A 500/A 500M, Grade B, Fy ' 46 ksi.
 - 4. Plate steel shall conform to ASTM A 36/A 36M, Fy ' 36 ksi.
 - 5. Structural steel shall be painted with a rust inhibitive (red oxide) primer (std).
- B. Sheet Metal:
 - 1. Decking: 3 inch (76 mm) by 24 inch (406 mm) by 20 gage cellular deck, ASTM A 653/A 653M GR40, Fy ' 40 ksi, galvanized steel with baked enamel finish color as selected by Architect from manufacturer's standard colors

C. STEEL REINFORCEMENT

1. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.

A. CONCRETE MATERIALS

- 1. 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, and obtain admixtures from single source from single manufacturer.
- 2. Cementitious Materials

- a. Portland Cement: ASTM C 150/C 150M, Type I Type II Type I/II, gray.
- b. Fly Ash: ASTM C 618, Class F.
- 3. Normal-Weight Aggregates: ASTM C 33/C 33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
 - a. Maximum Coarse-Aggregate Size: See mix designs.
 - b. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- 4. Air-Entraining Admixture: ASTM C 260/C 260M.
- 5. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - a. Mid-Range Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
 - 1) Use a mid-range water reducing admixture in all redi-mix concrete unless using a high-range water reducing admixture or super plasticizer.
 - b. High-Range, Water-Reducing Admixture or Super Plasticizer: ASTM C 494/C 494M, Type F.
 - 1) Use and dose as required for higher slump and for pumping. See additional requirements herein.
 - c. Retarding Admixture: ASTM C 494/C 494M, Type B.
 - 1) Use only with permission from the Owner's Representative.
- 6. Water: ASTM C 94/C 94M.

2.3 PRE-ENGINEERED METAL CANOPY

- A. General: Provide a complete, integrated set of manufacturer's canopy components, to form a pre-engineered canopy, ready for construction on project site. Design to be two-columns as shown on Drawings. Pre-engineered metal canopy will be designed to meet all applicable site structural wind, snow and seismic requirements. Calculations shall show adequate capacity of stacked members to resist overturning about their flanges.
- B. Columns to be centered width wise on the canopy and length wise spacing to be approximately 9ft-22ft-9ft.
- C. Seismic Performance: Metal building systems shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
- D. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 580 for Class 90.
- E. Design Load: As required for selected materials. 10 psf collateral MEP load.
- F. Maximum Deflection: 1/180 of the span.
- G. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.
- H. Canopy Fascia
 - 1. Aluminum Composite Panel (ACM): Available with a fluorocarbon paint finish, masked on one side. Shall be warranted for 20 years.

- I. Canopy Finishes: Comply with NAAMM MFM for recommendations for applying and designating finishes.
 - 1. 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.
- J. Fabrication: Fabricate pre-engineered canopies completely in factory.
- K. Canopy Lights: Canopy lights shall be LSI Industries Inc., Encore Series Model # EC S 320 PSMV F MT BRZ or approved equal. Lights shall be provided by canopy manufacturer. Contractor providing the canopy to pre wire and provide all required wiring and conduit. All wiring to terminate at an exterior water tight junction box for a single point power connection by the electrical contractor.
- L. Colors as selected by Architect from manufacturer's standard colors.
- M. Dimensions- 40' L x 32' W x 15' clear

2.4 ACCESSORIES

- A. General: Provide accessories as standard with metal building system manufacturer and as specified. Fabricate and finish accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes. Comply with indicated profiles and with dimensional and structural requirements.
- B. Downspout: Connect to roof drains within columns and run exposed along column side as shown. 3 inch (76 mm) by 4 inch (102 mm) by 24 gage hot-dip galvanized steel with baked enamel finish. Color as selected by Architect from manufacturer's standard colors
 - 1. Mounting Straps: Fabricated from same material, finish and color as downspouts.

2.5 FABRICATION

- A. General: Design components and field connections required for erection to permit easy assembly.
- B. Tolerances: Comply with MBMA's "Metal Building Systems Manual" for fabrication and erection tolerances.
- C. Primary Framing: Shop fabricate framing components to indicated size and section, with baseplates, bearing plates, stiffeners, and other items required for erection welded into place. Cut, form, punch, drill, and weld framing for bolted field assembly.
 - 1. Make shop connections by welding or by using high-strength bolts.
 - 2. Join flanges to webs of built-up members by a continuous, submerged arc-welding process.
 - 1. Brace compression flange of primary framing with steel angles or cold-formed structural tubing between frame web and purlin web or girt web, so flange compressive strength is within allowable limits for any combination of loadings.
 - 2. Weld clips to frames for attaching secondary framing.
 - 3. Shop Priming: Prepare surfaces for shop priming according to SSPC-SP 2. Shop prime

primary framing with specified primer after fabrication.

- D. Secondary Framing: Shop fabricate framing components to indicated size and section by rollforming or break-forming, with baseplates, bearing plates, stiffeners, and other plates required for erection welded into place. Cut, form, punch, drill, and weld secondary framing for bolted field connections to primary framing.
 - 1. Make shop connections by welding or by using non-high-strength bolts.
 - 2. Shop Priming: Prepare uncoated surfaces for shop priming according to SSPC-SP 2. Shop prime uncoated secondary framing with specified primer after fabrication.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine areas and conditions under which the work is to be installed, and notify the Contractor in writing, with a copy to the Owner and the Architect, of any conditions detrimental to the proper and timely completion of the work. Do not proceed with the work until unsatisfactory conditions have been corrected.
 - 1. Examine supporting foundations for compliance with manufacturer's requirements, including installation tolerances and other conditions affecting performance of supporting members.
 - 2. Check installed anchor bolts for accuracy. Verify that bearing surfaces are ready to receive the work.
 - 3. Verify the rough-in of required mechanical and electrical services prior to placement of the structure.
 - 4. If preparation is the responsibility of another installer, notify the Architect of unsatisfactory preparation before proceeding.
 - 5. Beginning of the work shall indicate acceptance of the areas and conditions as satisfactory by the Installer.

3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Provide temporary shores, guys, braces, and other supports during erection to keep structural framing secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural framing, connections, and bracing are in place unless otherwise indicated.

3.3 INSTALLATION

- A. A work area shall be required extending 10 feet (3 m) beyond buildings and canopies in all directions to the extent practical. The work area shall be flat, comprised of hard-packed soil or gravel, asphalt, or concrete, and free of open excavation, debris, construction equipment and construction workers. An additional flat work space a minimum of 25 feet (7.6 m) by 25 feet (7.6 m) or as practical shall be provided adjacent to the canopy and/or building for unloading and storing materials. Site to meet OSHA guidelines to allow lift equipment and scaffolding to maneuver the work area.
- B. Set pre-engineered metal canopy plumb and aligned. Level base plates true to plane with

full bearing on concrete bases.

- C. Fasten pre-engineered metal canopy columns to anchor bolts and/or foundation bolts.
- D. Provide anchor bolts as follows:
 - 1. Anchor bolts or foundation bolts in accordance with approved site specific drawings. They must not vary from the size and dimensions shown on the erection drawings. Use of a plywood template is recommended. Remove template prior to column erection.
 - 2. Anchor bolts shall conform to ASTM F 1554 (GR36), and shall have a minimum of 7 inches (178 mm) of exposed thread and 23 inch (584 mm) minimum embedment with 1- 1/4 inch (32 mm) nut and washer as embedment end.
 - 3. Shrinkage-resistant grout shall be ASTM C 1107, factory-packaged, aggregate grout, non-corrosive, non-staining, mixed with water to consistency suitable for application and a 30 minute working time installed by the Contractor.
- E. Provide bolted connections as follows:
 - 1. Structural erection bolts shall conform to ASTM A 325/A 325M.
 - 2. A minimum diameter of 3/4 inch (19 mm) erection bolts shall be used for cross beamto- column connections and a minimum of 5/8 inch (16 mm) diameter bolts for all other connections.
 - 3. Drilled holes in structural steel shall be deburred.
 - 4. Flat structural washers (minimum of one) shall be used on bolted connections.
 - 5. Bolts shall be tightened to snug tight per latest RCSC specifications (unless otherwise specified).
- F. Provide screws as follows:
 - 1. Fastening shall be performed per installation prints provided by the manufacturer.
 - 2. Installation screws shall be furnished with electrode deposited cadmium coating unless otherwise noted.
 - 3. Self-drilling and self-tapping screws shall have a sufficient cut point and a 1/2 inch (13 mm) outside diameter dished metal-backed neoprene washer to be used in water sealing applications .
- G. Provide pedestrian protection and warnings during construction which comply with local, Federal, and OSHA codes.
- H. Prior to steel erection of any kind, the Contractor shall grade, backfill and otherwise prepare the job site to allow for rolling scaffold and ensure safe working conditions including the removal or relocation of overhead power lines.
- I. Any grade or elevation situations which deviate from the approved manufacturer's plans shall be conveyed to the manufacturer prior to fabrication.
- J. All anchor bolts and/or leveling plates shall be set within 1/4 inch (6 mm) tolerance on layout and grade level.
- K. Temporary electrical power shall be provided.
- L. Connect electrical power service to power distribution system according to requirements specified in Division 26 Electrical.

M. Dumpster for trash and debris shall be provided by the Contractor.

3.4 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to canopy assembly and weather tight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install components required for a complete canopy assembly, including trim, copings, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 2. Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with corrosion-resistant coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by manufacturer.
- B. Gutters: Join sections with riveted-and-soldered or lapped-and-sealed joints. Attach gutters to eave with gutter hangers spaced as required for gutter size, but not more than 36 inches (914 mm) on-center using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and no more than 60 inches (1524 mm) on-center between top and bottom fasteners.
- 3.5 ADJUSTING AND CLEANING
 - A. After completing installation, inspect exposed finishes and repair damaged finishes.
 - 1. Repair damaged galvanized coatings on galvanized items with galvanized repair paint in accordance with ASTM A780 and manufacturer's written instructions.
 - 2. Touchup Painting: After erection, promptly clean, prepare, and prime or re-prime field connections, rust spots, and abraded surfaces of prime-painted structural framing, bearing plates, and accessories.
 - B. Erect and install the canopy and appurtenances in accordance with the manufacturer's printed instructions except as otherwise specified. Install the work of this Section so the structure is secure and weather tight, and exposed materials are free of visible dents, scratches, tool marks, cuts and other imperfections. Install system free of rattles, wind whistles, and noise due to thermal movement.

3.6 **PROTECTION**

- A. Protect installed products until completion of project.
- B. Touch-up, repair, or replace damaged products before Substantial Completion.

END OF SECTION

