



OBSERVATION TOWER /
FISHING PIER AND CANOE /
KAYAK LAUNCH
AT

**FERNDALE
PRESERVE**

Ferndale, Florida

SUPPLEMENTAL SPECIFICATIONS

May 6, 2022



POWELLSTUDIO
ARCHITECTURE

Observation Tower / Fishing Pier and Canoe / Kayak Launch at Ferndale Preserve
Ferndale, Florida

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PART 1 - GENERAL

1.1 DESCRIPTION

- A.** The work consists of the general construction of an observation tower and fishing pier with a canoe and kayak launch area, as well as a precast concrete boardwalk located at in Ferndale Preserve.
- B.** Substitutions for specified materials or products elected to be incorporated in the project must be included by fully executed change order.

1.2 SHOP DRAWINGS, PRODUCT DATA, SAMPLES

- A.** Submit shop drawings for manufactured or fabricated materials **as called for in the separate Sections of these Specifications.**
- B.** Fully identify drawings by name, location, supplier's name, date, drawing number, Specifications section reference, etc.
- C.** Contractor shall submit with such promptness as to cause no delay in his work, or that of any other Contractor.
- D.** It is the Contractor's responsibility to properly schedule the submission of Shop Drawings for approval to allow adequate time for checking of drawings, manufacture and shipment of items to job site in sufficient time to prevent delay in the progress of the Work.
- E.** It is the Contractor's responsibility to coordinate the preparation of Shop Drawings of items which will be furnished by more than one manufacturer but are designed to interface when installed.
- F. Number of Submittals required:**
 - 1.** Shop Drawings: Submit one hard copy, or one PDF electronic submittal.
 - 2.** Product Data: Submit the number of copies which the Contractor requires, plus three (3) copies to the Architect for review.
 - 3.** Samples: Submit the number stated in each specification section.
 - 4.** Design Calculations/Test Reports: Submit the number of copies which the Contractor requires, plus three (3) which will be retained by the Architect and Engineer.
- G.** Shop Drawings submitted to the Architect for his approval shall first be checked and approved by the Contractor, the prima-facie evidence of which shall be a "**checked**" stamp marked "**Approved**", or "**Approved As Noted**" on each copy of each Shop Drawing, placed thereon by the Contractor.

- H. Shop Drawings received without the Contractor's "checked" stamp will be cause for immediate return without further action.**
- I. Each drawing correctly submitted will be checked by the Architect or Engineer and returned to the Contractor marked by him in one of the following ways:**
- 1. ACCEPTED**
 - 2. ACCEPTED AS NOTED**
 - 3. REJECTED**
 - 4. REVISE AND RESUBMIT AS NOTED**
- J. Shop Drawings and submittals received by the Architect for parts of the Work which do not required Shop Drawings or submittals, as called for in the separate Sections of these Specifications, will not be reviewed and will not be returned to the Contractor.**
- K. Shop Drawing submittals which differ from the Drawings and Specifications and approved by the Owner shall be done so with the understanding and warranty by the Contractor that:**
- 1. The substitution will do the whole job adequately.**
 - 2. The substitution will fit the assigned space.**
 - 3. The substitution conforms to all relevant details of the Drawings and Specifications.**
 - 4. The substitution is according to code and that it is safe.**
 - 5. The substitution is acceptable to the Owner.**
 - 6. The substitution is acceptable to the effected trades.**
 - 7. The Contractor has agreed with all effected contractors to pay them for extra expenses and inconveniences caused by the substitution.**
 - 8. The substitution will be provided at no additional cost to the Owner.**

 - 9. The Contractor agrees that if the substituted material, item or system fails or does not perform properly within the first twelve months after the Date of Substantial Completion, then the Contractor shall replace the material, item or system with the specified material, item or system at no cost to the Owner.**

1.3 PROJECT CLOSEOUT

- A. General:**
- 1. When the contractor considers the work is substantially complete, submit a written notice accompanied with a list (punch list) of items to be completed or corrected.**
 - 2. Within a reasonable length of time of notice, the Architect will make observations to confirm the notice and determine the status of completion.**
 - 3. Should the Architect determine that the work is not substantially complete, he will notify the contractor allowing the contractor to remedy the deficiencies in the work after which a second notification is to be provided.**

B. Observation Fees:

1. Should the second response to notice determine that the work fails to comply with the claims of status of final completion made by the Contractor, the Owner will compensate the Architect for such additional services.
2. Owner will deduct the amount of such compensation from the final payment to the Contractor.

C. Concurrence That Work Is Substantially Complete:

1. Upon concurrence, the Architect will prepare a Certificate of Substantial Completion on AIA Form G 704, accompanied by the Contractor's list (punch list) of items to be completed or corrected, as verified and amended by the Architect.
2. The Architect will submit the Certificate to the Owner and Contractor for their written acceptance of the responsibilities assigned to them in the Certificate.

D. Closeout Documents; Submit prior to submittal for final payment:

1. Evidence of compliance with requirements of governing authorities:
 - a. Certificate of Occupancy
 - b. Certificate of Inspection as required other than the Certificate of Occupancy.
2. Certification of Survey of building locating by the General Contractor.
3. Warranties and Bonds
4. Evidence of Payment and Release Liens
5. Certificates of Insurance for Products and Completed Operations as specified.

END OF SECTION

PART 1 - GENERAL

1.01 CODES

The following codes have been used in the design of the project, and shall be followed by the contractor for the construction:

NFPA-70-2020	National Electric Code
NFPA-101- 2021	Life Safety Code
FBC-2020	Florida Building Code, 7th Edition
FPC-2020	Florida Plumbing Code, 7th Edition
FMC-2020	Florida Mechanical Code, 7th Edition
FBC-2020	Florida Energy Conservation Code, 7th Edition
FAC-2020	Florida Accessibility Code, 7th Edition
FFPC-2020	Florida Fire Prevention Code, 7th Edition

PART 2 - TEMPORARY CONSTRUCTION AND SERVICES

3.01 The Contractor shall provide the following specific items of temporary construction and services:

A. Temporary Electric Service:

1. Temporary electric service required in the performance of the Contract shall be furnished and paid for by the Contractor who shall furnish, install and maintain all temporary transformers, meters and other wiring and fittings for both light and power at locations required in the Work, and shall bear the costs of bringing service to the site and for making the service connections.
2. Before final acceptance, temporary electrical service facilities installed by the Contractor shall be removed, and the service connections severed in acceptable manner.
3. Adequate lighting and convenience outlets shall be furnished and installed as may be necessary for proper performance and inspection of the Work.
4. If operations are carried out during hours of darkness, adequate floodlights, clusters, and spot illumination shall be furnished and maintained during all hours that natural illumination is deemed by the Architect as being insufficient for the Work being performed.

B. Construction Environmental Control:

1. Until such time as use of permanent building systems may be employed, each Contractor shall be responsible to provide and maintain an adequate construction environment which shall protect the Contractor's work against the hazards of cold weather, hot weather, excessive dry conditions, excessive humidity, other unsuitable environment conditions which might cause damage or defects in the Work.
2. These specifications describe some means of providing and maintaining protection against hazards of severe weather and certain ventilation requirements which shall be interpreted as minimum conditions which might be encountered.
3. Each Contractor shall carry out such responsibilities and shall provide and

maintain such other means of environmental control as recommended and/or required to comply with specified manufacturer's recommendations, requirements hereinafter specified, or other conditions needed in performance of the Work.

4. Each Contractor shall protect his work against cold weather and provide means to maintain 40 degrees F., or higher temperatures as deemed suitable or necessary to the Work.
5. Costs for fuel consumed through the permanent heating and ventilating system during the construction period will be borne by the General Contractor.

C. Protection of Work in Progress:

1. Work in place that is subject to injury, because of operations being carried on adjacent thereto, shall be covered, boarded up, or substantially enclosed with adequate protection.
2. Permanent openings used for thoroughfares for the introduction of work and materials to the structure shall have heads, jambs and sills well blocked and boarded.
3. All forms of protection shall be constructed in a manner such that, upon completion, the entire Work will be delivered to the Owner in proper, whole, and unblemished condition.

END OF SECTION

PART 1-GENERAL**1.1 SUMMARY**

- A.** These specifications are for a precast concrete boardwalk and shall be regarded as minimum standards for this project. These specifications are based upon products designed and supplied by PermaTrak North America LLC. This item shall also include the design, specification, and construction of a railing and foundation system that is attached to the proposed boardwalk system.

1.2 ALTERNATE REQUIREMENTS: Alternates are allowed provided that the following minimum standards and these “Precast Concrete Boardwalk System” specifications are met.

- A.** “Minimum Standards” as outlined in section 1.3 below must be met.
- B.** A drawing of the precast boardwalk system (including tread layout, structural details designed for the design loads shown on the contract documents, foundation design and layout) must be submitted 2 weeks before the bid date and signed and sealed by a Professional Engineer registered in the state of Florida.
- C.** Submittal must meet the requirements set forth in section 1.6a.

1.3 MINIMUM STANDARDS: The selected boardwalk shall have the following minimum characteristics:

- A.** Boardwalk system (beams, treads, and curbs if applicable) must be precast concrete. A material change, including cast-in-place concrete, is not considered an equal to the design shown on the bid documents.
- B.** Walking surface (treads) shall be made of precast concrete, and supported by precast concrete beams. Where applicable, edges of treads will receive precast concrete curbs.
- C.** Walking surface (finish) of top surface of treads shall have a formliner finish with one of PermaTrak’s standard textures (sandblast, broom or timber). Texture must be integral with the concrete and shall not be an applied post pour wearing surface. Finishes shall conform those specified on the architectural drawings.
- D.** Precast concrete treads shall be structural load bearing elements and shall interlock with one another via a “tongue and groove” connection.
- E.** All precast shall consist of integrally colored concrete in a color selected by the Architect from one the manufactures’ standard colors.
- F.** **DESIGN LOADS:** Designed for the following live loads:

1. Pedestrian and equipment live load of 100 psf.
- G.** Treads shall maintain a “boardwalk appearance”, specifically meaning each tread shall have a width: length ratio ranging from a minimum of 3:1 to a maximum of 14:1. Width is defined as the tread dimension perpendicular to the normal direction of travel. Length is defined as the tread dimension measured in the direction of travel.
- H.** Tread width shall be as noted on the contract drawings. Alignment should follow the horizontal and vertical alignment shown on the contract plans.
- I.** Connectors for curbs (if applicable) to treads shall not be visible to boardwalk users while viewed from the top of the walkway.
- J.** All boardwalk connectors shall be non-corrosive, and hidden from view. Metallic connectors are not acceptable for this project, unless specified on the structural drawings.
- K.** Boardwalk supplier shall provide a field representative on site for a minimum of 1 day. Field representative shall be knowledgeable in the installation of precast concrete boardwalks.

1.4 QUALITY ASSURANCE

- A.** The contractor performing the installation of the pile foundations shall have installed piles of size and length similar to those shown on the plans for a minimum of three (3) years prior to the bid date for this project. The contractor shall submit a list containing at least three (3) projects completed in the last three (3) years on which the contractor has installed piles of a size and length similar to those shown on the plans. The list of projects shall contain names and phone numbers of owner’s representatives who can verify the Contractor’s participation on those projects.
- B.** Manufacturer Qualifications: Not less than 10 years experience in the actual production of precast products as described below.
 1. Components shall be factory fabricated and engineered by single entity.
 2. Boardwalk supplier (Precaster) for the boardwalk shall have in-house color mixing facilities for color pigmentation.
 3. Boardwalk supplier (Precaster) shall have either a minimum experience of 5 years or 50 boardwalk projects in design, production, and field consultation.
 4. Boardwalk supplier (Precaster) must be certified by PCI or NPCA.
 5. Precast components must be manufactured with the use of hot rolled steel skin in reinforced steel forms. Temporary single use forms are unacceptable.

- C. Acceptability Criteria for Treads and Curbs (if applicable): The finished visible (in the final installed position) surface shall have no obvious imperfections other than minimal color or texture variations from the approved samples or evidence of repairs when viewed in good typical daylight illumination with the unaided naked eye at a 20 ft. viewing distance. Appearance of the surface shall not be evaluated when light is illuminating the surface from an extreme angle as it tends to accentuate the minor surface irregularities. The following is a list of finish defects that shall be properly repaired, if obvious when viewed at a 20 ft. distance. Patching (by a trained skilled concrete repair person) is an acceptable repair method.
1. Ragged or irregular surfaces.
 2. Excessive air voids (commonly called bug holes) larger than ¼ in. evident on the top surface of the tread or curbs (if applicable).
 3. Adjacent flat and return surfaces with greater texture and/or color differences than the approved samples or mockups.
 4. Casting and/or aggregate segregation lines evident from different concrete placement lifts and consolidation.
 5. Visible mold joints or irregular surfaces.
 6. Rust stains on exposed surfaces.
 7. Units with excessive variation in texture and/or color from the approved samples, within the unit or compared with adjacent units.
 8. Blocking stains evident on exposed surfaces.
 9. Areas of backup concrete bleeding through the facing concrete.
 10. Foreign material embedded in the surface.
 11. Visible repairs at a 20 ft. viewing distance.
 12. Reinforcement shadow lines.
 13. Cracks visible at a 20 ft. viewings distance.
- D. Installer Qualifications: Firm with 3 years experience in installation of systems similar in complexity to those required for this Project.
- E. Mock-Up: Provide, if required by Architect/ Engineer, a mock-up for evaluation of the boardwalk showing the surface preparation techniques and application workmanship.
1. Finish areas designated by Architect / Engineer.
 2. Do not proceed with remaining work until mock-up is accepted by Architect / Engineer.
 3. Refinish mock-up area as required to produce acceptable work.

1.5 DESIGN

- A. The designer of the boardwalk, foundation and railing system shall be a qualified registered Professional Engineer licensed and registered in the State of Florida and

experienced in the design of concrete structures, foundation and railing systems.

B. DESIGN CRITERIA: The design of the boardwalk and railing system shall comply with the following guidelines:

1. Florida Building Code 2020 and ASCE 7-16 Minimum Design Loads and Associated Criteria for Buildings and Other Structures
2. American Concrete Institute 2014 – Building Code and Commentary.
3. In addition to the dead loads of the system, the structure shall be designed for the live loads defined in Section 1.3.E above and as specified on the structural drawings.
4. Railings structural requirements:
 - a. Handrail and railing assemblies and attachments shall resist a minimum concentrated load of 200 pounds (91 kg) applied in any direction at any point on the top rail and a vertical and horizontal thrust of 50 lb./lf (0.73 kN/m) applied to the top railing without permanent set or damage. The two loads are not cumulative.
 - b. Infill area of railing system capable of resisting a horizontal concentrated load of 200 pounds applied to one square foot (8165 g/sq. m) at any point in the system. This loading shall not be applied simultaneously with other loading conditions.
 - c. Handrail assemblies and guards shall be designed to resist a load of 50 pounds per linear foot (0.73 kN/m) applied in any direction at the top and to transfer this load through the supports to the structure.
5. Railings shall be suitable for pedestrian traffic and shall be a minimum of 42-inches above the tread / deck surface.

1.6 SUBMISSIONS: Prior to the start of fabrication or construction, the Contractor shall submit to the Engineer a design package, which shall include, but is not limited to, the following:

A. PRELIMINARY SUBMISSIONS: Prior to the start of fabrication or construction, the Contractor shall submit to the Engineer a design package, which shall include but not limited to the following:

1. DETAILED PLANS:
 - a. REGISTRATION / SEAL: Sealed by a licensed Professional Engineer registered in the State of Florida.
 - b. PLAN VIEW: Full plan view of the boardwalk, foundation and railing system drawn to scale. The plan view must reflect the proposed horizontal alignment as shown on the design plans.

- c. **ELEVATION VIEW:** Full elevation view of the boardwalk, railing and foundation system drawn to scale which reflect the actual vertical alignment. Elevation views shall indicate the elevation at the top and bottom of the boardwalk and foundation system components, horizontal and vertical break points, and location of the finished grade. The elevation views must indicated the required cut off elevation of piles.
- d. **DETAILS:** Details of all boardwalk and railing system components and their connections such as the length, size and where changes occur; connections; etc.
- e. **CODE REFERENCE:** Design parameters used along with Florida Building Code 2020.

2. DESIGN COMPUTATIONS: computations shall:

- a. Be stamped by a licensed Professional Engineer in the state of Florida.
- b. Computations shall clearly refer to the applicable Florida Building Code provisions
- c. Documentation of computer programs including all design parameters.

3. CONSTRUCTION SPECIFICATIONS:

- a. Construction methods specific to the boardwalk vendor chosen. Submittal requirements such as certification, quality and acceptance/rejection criteria shall be included. Details on connection of boardwalk units and foundation system such that assurance of uniform load transfer shall be checked.

B. FINAL SUBMISSION: Once a boardwalk, foundation and railing system design has been reviewed and accepted by the Owner, the Contractor shall submit the final plans. The designer of the boardwalk, foundation and railing system is responsible for the review of any drawings prepared for fabrication. One set of all approved shop drawings shall be submitted to the Engineer's permanent records.

C. SUBMITTALS: Product Data: Submit Manufacturer's technical product data for railing components and accessories.

Manufacturer to supply submittal drawings for approval to include the following:

- 1. Section-thru details.
- 2. Mounting methods.
- 3. Typical Elevations.
- 4. Key plan layout.

- D. SHOP DRAWINGS:** Shop drawing showing actual field conditions and true elevation and location supplied after field verification.

1.7 DELIVERY, STORAGE, AND HANDLING

- A.** Store products in manufacturer's unopened packaging until ready for installation.
- B.** Field Measurements: Where handrails and railings are indicated to fit to other construction, check actual dimensions of other construction by accurate field measurements before fabrication; show recorded measurements on final shop drawings:
 - 1.** Where field measurements cannot be made without delaying the railing fabrication and delivery, obtain guaranteed dimensions in writing by the Contractor and proceed with fabrication of products so as not to delay fabrication, delivery and installation.
- C.** Coordinate fabrication and delivery schedule of handrails with construction progress and sequence to avoid delay of railing installation.

1.8 WARRANTY:

- A.** Contractor will be responsible for installation defects associated with the boardwalk and abutment components, foundation system, and railings for a period of 12 calendar months from the date of final acceptance by the Owner.
- B.** Boardwalk manufacturer shall warranty all precast concrete components against defects in material and workmanship for a period of ten years.
- C.** Railing manufacturer shall warranty the railing against defects in materials and workmanship for a period of 12 months.

1.9 MEASUREMENT AND PAYMENT

- A.** Precast concrete boardwalk, railings, and foundations shall be paid for at the contract lump sum price as listed in the bid proposal for "Precast Concrete Boardwalk". This price shall include all materials, equipment, labor and work necessary for and incidental to the design, construction, delivery, unloading, assembly, and placement of the boardwalk and foundation as shown in the contract plans including all railings on the superstructure.

PART 2-MATERIALS & TESTING

- 2.1 PRECAST CONCRETE:** shall conform to the following:

SECTION 02310**PRECAST CONCRETE BOARDWALK SYSTEM**

- a. The minimum compressive strength of the concrete shall be 5,000 psi measured at 28 days.
- b. All precast concrete components shall be air entrained composed of Portland cement, fine and coarse aggregates, admixtures and water. The air-entraining feature may be obtained by the use of either an air entraining Portland cement or an air entraining admixture. The entrained air-content shall be not less than four percent or more than seven percent.

PART 3 - EXECUTION**1.1 PRECAST CONCRETE BOARDWALK**

- A. Installation of the precast concrete boardwalk system and railings, if applicable, shall be performed in accordance to the approved plans and manufacturers installation instructions. Boardwalk manufacturer shall provide a field representative to review installation instructions with the Contractor and Engineer and to certify that the installation has been performed according to the approved drawings and manufacturer's instructions.

END SECTION

PART 1 - GENERAL**1.1 SUMMARY****A. Section Includes:**

1. Cast-in-place concrete, including concrete materials, mixture design, placement procedures, and finishes.

1.2 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash, slag cement, and other pozzolans materials subject to compliance with requirements.
- B. Water/Cement Ratio (w/cm): The ratio by weight of water to cementitious materials.

1.3 ACTION SUBMITTALS**A. Product Data: For each of the following.**

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Blended hydraulic cement.
5. Aggregates.
6. Admixtures:
 - a. Include limitations of use, including restrictions on cementitious materials, supplementary cementitious materials, air entrainment, aggregates, temperature at time of concrete placement, relative humidity at time of concrete placement, curing conditions, and use of other admixtures.
7. Curing materials.

B. Design Mixtures: For each concrete mixture, include the following:

1. Mixture identification.
2. Minimum 28-day compressive strength.
3. Durability exposure class.
4. Maximum w/cm.
5. Calculated equilibrium unit weight, for lightweight concrete.
6. Slump limit.
7. Air content.
8. Nominal maximum aggregate size.
9. Indicate amounts of mixing water to be withheld for later addition at Project site if permitted.
10. Intended placement method.

11. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.

C. Shop Drawings:

1. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
 - a. Location of construction joints is subject to approval of the Architect.

D. Concrete Schedule: For each location of each Class of concrete indicated in "Concrete Mixtures" Article, including the following:

1. Concrete Class designation.
2. Location within Project.
3. Exposure Class designation.
4. Formed Surface Finish designation and final finish.
5. Curing process.

1.4 INFORMATIONAL SUBMITTALS

A. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Curing compounds.
4. Vapor retarders.

B. Material Test Reports: For the following, from a qualified testing agency:

1. Portland cement.
2. Fly ash.
3. Slag cement.
4. Aggregates.
5. Admixtures:

C. Research Reports: For concrete admixtures in accordance with ICC's Acceptance Criteria AC198.

D. Preconstruction Test Reports: For each mix design.

E. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Ready-Mixed Concrete Manufacturer Qualifications:** A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.

1. Manufacturer certified in accordance with NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

1.6 PRECONSTRUCTION TESTING

- A. Preconstruction Testing Service: Engage a qualified testing agency to perform preconstruction testing on each concrete mixture.
 1. Include the following information in each test report:
 - a. Admixture dosage rates.
 - b. Slump.
 - c. Air content.
 - d. Seven-day compressive strength.
 - e. 28-day compressive strength.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94/C94M and ACI 301 (ACI 301M).

1.8 FIELD CONDITIONS

- A. Cold-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 306.1.
- B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M).

PART 2 - PRODUCTS**2.1 CONCRETE, GENERAL**

- A. ACI Publications: Comply with ACI 301 (ACI 301M) unless modified by requirements in the Contract Documents.

2.2 CONCRETE MATERIALS

- A. Cementitious Materials:
 1. Portland Cement: ASTM C150/C150M, Type I/II or Type III, gray.
 2. Fly Ash: ASTM C618, Class C or F.
 3. Slag Cement: ASTM C989/C989M, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C33/C33M, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source.
 1. Maximum Coarse-Aggregate Size: 1 inch nominal.
 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.

- C. Air-Entraining Admixture: ASTM C260/C260M.
- D. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures that do not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
 - 1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
 - 2. Retarding Admixture: ASTM C494/C494M, Type B.
 - 3. Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type D.
 - 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
 - 5. High-Range, Water-Reducing and -Retarding Admixture: ASTM C494/C494M, Type G.
 - 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- E. Water and Water Used to Make Ice: ASTM C94/C94M, potable or complying with ASTM C1602/C1602M, including all limits listed in Table 2 and the requirements of paragraph 5.4.

2.3 CURING MATERIALS

- A. Water: Potable or complying with ASTM C1602/C1602M.
- B. Clear, Waterborne, Membrane-Forming, Dissipating Curing Compound: ASTM C309, Type 1, Class B.
- C. Clear, Waterborne, Membrane-Forming, Nondissipating Curing Compound: ASTM C309, Type 1, Class B, certified by curing compound manufacturer to not interfere with bonding of floor covering.

2.4 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, in accordance with **ACI 301 (ACI 301M)**.
 - 1. Use a qualified testing agency for preparing and reporting proposed mixture designs, based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. Fly Ash or Other Pozzolans: 25 percent by mass.
 - 2. Slag Cement: 50 percent by mass.
 - 3. Total of Fly Ash or Other Pozzolans, Slag Cement: 50 percent by mass, with fly ash or pozzolans not exceeding 25 percent by mass.
 - 4. Total of Fly Ash or Other Pozzolans: 35 percent by mass with fly ash or pozzolans not exceeding 25 percent by mass.
- C. Admixtures: Use admixtures in accordance with manufacturer's written instructions.
 - 1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.

2. Use water-reducing and -retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
3. Use water-reducing admixture in pumped concrete and concrete with a w/cm below 0.50.

2.5 CONCRETE MIXTURES

- A. Class A: Normal-weight concrete used for pile caps, grade beams, and tie beams.
 1. Exposure Class: ACI 318 (ACI 318M) F0 ,S0, W1, C2.
 2. Minimum Compressive Strength: 6000 psi at 28 days.
 3. Maximum w/cm: 0.40
 4. Slump Limit: 5 inches, plus or minus 1 inch before adding high-range water-reducing admixture or plasticizing admixture at Project site.

2.6 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete in accordance with ASTM C94/C94M and furnish batch ticket information.

PART 3 - EXECUTION**3.1 INSTALLATION OF 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.
 1. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 2. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of ANSI/AISC 303.

3.2 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, embedded items, and vapor retarder is complete and that required inspections are completed.
 1. Immediately prior to concrete placement, inspect vapor retarder for damage and deficient installation, and repair defective areas.
 2. Provide continuous inspection of vapor retarder during concrete placement and make necessary repairs to damaged areas as Work progresses.
- B. Notify Architect and testing and inspection agencies 24 hours prior to commencement of concrete placement.

- C. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect in writing, but not to exceed the amount indicated on the concrete delivery ticket.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of **ACI 301 (ACI 301M)**, but not to exceed the amount indicated on the concrete delivery ticket.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- E. 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.
 - 1. If a section cannot be placed continuously, provide construction joints as indicated.
 - 2. Deposit concrete to avoid segregation.
 - 3. Deposit concrete in horizontal layers of depth not to exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 4. Consolidate placed concrete with mechanical vibrating equipment in accordance with ACI 301 (ACI 301M).
 - a. Do not use vibrators to transport concrete inside forms.
 - b. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer.
 - c. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity.
 - d. 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.

3.3 FINISHING FORMED SURFACES

- A. As-Cast Surface Finishes:
 - 1. ACI 301 (ACI 301M) Surface Finish SF-1.0: As-cast concrete texture imparted by form-facing material.
 - a. Patch voids larger than 1-1/2 inches (38 mm) wide or 1/2 inch (13 mm) deep.
 - b. Remove projections larger than 1 inch (25 mm).
 - c. Tie holes do not require patching.
 - d. Surface Tolerance: ACI 117 (ACI 117M) Class D.

3.4 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling In:

1. Fill in holes and openings left in concrete structures after Work of other trades is in place unless otherwise indicated.
2. Mix, place, and cure concrete, as specified, to blend with in-place construction.
3. Provide other miscellaneous concrete filling indicated or required to complete the Work.

3.5 CONCRETE CURING

- A. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures.
 1. Comply with ACI 301 (ACI 301M) and ACI 305.1 (ACI 305.1M) for hot-weather protection during curing.
 2. Maintain moisture loss no more than 0.2 lb/sq. ft. x h (1 kg/sq. m x h), calculated in accordance with ACI 305.1, before and during finishing operations.
- B. Curing Formed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:
 1. Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces.
 2. Cure concrete containing color pigments in accordance with color pigment manufacturer's instructions.
 3. If forms remain during curing period, moist cure after loosening forms.
 4. If removing forms before end of curing period, continue curing for remainder of curing period, as follows:
 - a. Continuous Fogging: Maintain standing water on concrete surface until final setting of concrete.
 - b. Continuous Sprinkling: Maintain concrete surface continuously wet.
 - c. Absorptive Cover: Pre-dampen absorptive material before application; apply additional water to absorptive material to maintain concrete surface continuously wet.
 - d. Water-Retention Sheeting Materials: Cover exposed concrete surfaces with sheeting material, taping, or lapping seams.
 - e. Membrane-Forming Curing Compound: Apply uniformly in continuous operation by power spray or roller in accordance with manufacturer's written instructions.
 - 1) Recoat areas subject to heavy rainfall within three hours after initial application.
 - 2) Maintain continuity of coating and repair damage during curing period.
- C. Curing Unformed Surfaces: Comply with ACI 308.1 (ACI 308.1M) as follows:
 1. Begin curing immediately after finishing concrete.
 2. Interior Concrete Floors:
 - a. Floors to Receive Floor Coverings Specified in Other Sections: Contractor has option of the following:
 - 1) Ponding or Continuous Sprinkling of Water: Maintain concrete surfaces continuously wet for not less than seven days, utilizing one, or a combination of, the following:

- a) Water.
- b) Continuous water-fog spray.

3.6 APPLICATION OF LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment in accordance with manufacturer's written instructions.
 - 1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
 - 2. Do not apply to concrete that is less than **[three] [seven] [14] [28]** days' old.
 - 3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing.
 - 4. Rinse with water; remove excess material until surface is dry.
 - 5. Apply a second coat in a similar manner if surface is rough or porous.

3.7 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a special inspector to perform field tests and inspections and prepare testing and inspection reports.
- B. Testing Agency: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
 - 1. Testing agency shall be responsible for providing curing container for composite samples on Site and verifying that field-cured composite samples are cured in accordance with ASTM C31/C31M.
 - 2. Testing agency shall immediately report to Architect, Contractor, and concrete manufacturer any failure of Work to comply with Contract Documents.
 - 3. Testing agency shall report results of tests and inspections, in writing, to Owner, Architect, Contractor, and concrete manufacturer within 48 hours of inspections and tests.
 - a. Test reports shall include reporting requirements of ASTM C31/C31M, ASTM C39/C39M, and ACI 301, including the following as applicable to each test and inspection:
 - 1) Project name.
 - 2) Name of testing agency.
 - 3) Names and certification numbers of field and laboratory technicians performing inspections and testing.
 - 4) Name of concrete manufacturer.
 - 5) Date and time of inspection, sampling, and field testing.
 - 6) Date and time of concrete placement.
 - 7) Location in Work of concrete represented by samples.
 - 8) Date and time sample was obtained.
 - 9) Truck and batch ticket numbers.
 - 10) Design compressive strength at 28 days.
 - 11) Concrete mixture designation, proportions, and materials.
 - 12) Field test results.

- 13) Information on storage and curing of samples before testing, including curing method and maximum and minimum temperatures during initial curing period.
 - 14) Type of fracture and compressive break strengths at seven days and 28 days.
- C.** Batch Tickets: For each load delivered, submit three copies of batch delivery ticket to testing agency, indicating quantity, mix identification, admixtures, design strength, aggregate size, design air content, design slump at time of batching, and amount of water that can be added at Project site.
- D.** Inspections:
1. Batch Plant Inspections: On a random basis, as determined by Architect.
- E.** Concrete Tests: Testing of composite samples of fresh concrete obtained in accordance with ASTM C 172/C 172M shall be performed in accordance with the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
 - a. When frequency of testing provides 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. Slump: ASTM C143/C143M:
 - a. 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.
 - b. Perform additional tests when concrete consistency appears to change.
 3. Concrete Temperature: ASTM C1064/C1064M:
 - a. One test hourly when air temperature is 40 deg F (4.4 deg C) and below or 80 deg F (27 deg C) and above, and one test for each composite sample.
 4. Unit Weight: ASTM C567/C567M fresh unit weight of structural lightweight concrete.
 - a. One test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 5. Compression Test Specimens: ASTM C31/C31M:
 - a. Cast and laboratory cure two sets of three [four 6-inch (150 mm) by 12-inch (300 mm) or 4-inch (100 mm) by 8-inch (200 mm) cylinder specimens for each composite sample.
 6. Compressive-Strength Tests: ASTM C39/C39M.
 - a. Test one set of one laboratory-cured specimens at seven days and one set of two specimens at 28 days.

- b.** A compressive-strength test shall be the average compressive strength from a set of two 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 (3.4 MPa) if specified compressive strength is 5000 psi (34.5 MPa), or no compressive strength test value is less than 10 percent of specified compressive strength if specified compressive strength is greater than 5000 psi (34.5 MPa).
- 8.** 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.
- 9.** Additional Tests:
 - a.** 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.
 - b.** Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42/C42M or by other methods as directed by Architect.
 - 1) Acceptance criteria for concrete strength shall be in accordance with ACI 301 (ACI 301M), section 1.6.6.3.
- 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.

3.8 PROTECTION

- A.** Protect concrete surfaces as follows:
 - 1.** Protect from petroleum stains.
 - 2.** Diaper hydraulic equipment used over concrete surfaces.
 - 3.** Prohibit vehicles from interior concrete slabs.
 - 4.** Prohibit use of pipe-cutting machinery over concrete surfaces.
 - 5.** Prohibit placement of steel items on concrete surfaces.
 - 6.** Prohibit use of acids or acidic detergents over concrete surfaces.

END OF SECTION 033000

PART 1 - GENERAL**1.1 SUMMARY**

- A. Section includes solid, precast, prestressed concrete piles.

1.2 UNIT PRICES

- A. Contract Sum: Base Contract Sum on number and dimensions of piles indicated from tip to cutoff, plus not less than 18 inches (305 mm) of overlength for cutting piles at cutoff elevations.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference prior to beginning work.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For concrete piles. Prepared by or under the supervision of a qualified professional engineer detailing fabrication and lifting devices necessary for handling and driving piles.
 - 1. Indicate pile dimensions, cross sections, locations, and sizes. Show details of pile splices and shoes.
 - 2. Indicate types of reinforcement, including prestressing strand, and detail fabricating, bending, and placing.
 - 3. Indicate layout and dimensions, and identify each pile. Indicate welded connections by AWS standard symbols. Detail cast-in hardware.
 - 4. Indicate transportation, storage, and lifting points.
- C. Delegated-Design Submittal: For concrete piles.
 - 1. Indicate compliance with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Concrete design mixes.
- C. Material certificates.

- D. Material test reports.
- E. Pile-Driving Equipment Data: Include type, make, and rated energy range; weight of striking part of hammer; weight of drive cap; and, type, size, and properties of hammer cushion.
- F. Pile-driving records.
- G. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Participates in PCI's Plant Certification Program and is designated a PCI-Certified Plant for B2 product group and category, or better.
- B. Design Practices: Comply with ACI 318 (ACI 318M) and the recommendations in PCI Committee Report: "Recommended Practice for Design, Manufacture and Installation of Prestressed Concrete Piling."
- C. Quality-Control Standard: PCI MNL-116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."
- D. Comply with requirements in ACI 301, "Specifications for Structural Concrete."
- E. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.4/D1.4M, "Structural Welding Code - Reinforcing Steel."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store piles at Project site to prevent cracking, distorting, warping, or other physical damage, and so markings are visible.
- B. Lift and support piles only at designated lifting or supporting points as shown 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 piles, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Structural Performance: Piles shall withstand transportation, erection, and driving stresses and design loads within limits indicated and under conditions existing at Project site.
 - 1. Design Loads: 20 kips vertical (down) load, 3 kips lateral load.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615/A615M, Grade 60; deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A706/A706M.
 - 1. Steel Reinforcement: ASTM A615/A615M, Grade 60, deformed.

2.3 PRESTRESSING TENDONS

- A. Prestressing Strand: ASTM A416/A416M, Grade 250 or 270 (Grade 1725 or 1860); uncoated, seven-wire, low-relaxation strand.

2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I or Type III, of same type, brand, and source.
 - 1. Fly Ash: ASTM C618, Class C or F.
 - 2. Silica Fume: ASTM C1240, amorphous silica.
- B. Normal-Weight Aggregates: Except as modified by PCI MNL-116, ASTM C33/C33M, with coarse aggregates complying with Class 4S. Provide aggregates from single source.
- C. Water: Potable, complying with chemical limits of PCI MNL-116.
- D. Air-Entraining Admixture: ASTM C260/C260M.

2.5 PILE ACCESSORIES

- A. Pile Splices: Manufactured from carbon-steel plates or castings and capable of developing strength of continuous pile at splice location.

2.6 CONCRETE MIXES

- A. Prepare design mixes for each type of concrete required.
 - 1. Limit use of fly ash and silica fume to not exceed, in total, 20 percent of portland cement by weight.
- B. Proportion mixes 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): 6000 psi
 - 2. Maximum Water-Cementitious Material Ratio: 0.40.
 - 3. Air Content: 0 to 3 percent.

2.7 FABRICATION

- A. Reinforcement: Comply with recommendations in CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy bond with concrete.
- B. Prestress tendons for piles by either pretensioning or post-tensioning methods. Comply with PCI MNL-116.
- C. Pile Splices: Accurately position and secure pile-splice segments requiring embedding in tips of piles.
- D. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in piles. Comply with requirements in PCI MNL-116 for measuring, mixing, transporting, and placing concrete.
- E. Fabricate precast, prestressed concrete piles straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL-116 and PCI MNL-135 product tolerances.
- F. Finish: Fabricate concrete piles with normal plant-run finish produced in forms that impart a smooth finish to concrete. Small surface holes caused by air bubbles, normal color variations, form joint marks, and minor chips and spalls are tolerated. Major or unsightly imperfections, honeycombs, or structural defects are not permitted.
 - 1. Finish unformed surfaces by trowel unless otherwise indicated. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.
- G. Pile-Length Markings: Mark each pile with horizontal lines at 12-inch intervals; label the distance from pile tip at 60-inch intervals. Maintain markings on piles until driven.

2.8 SOURCE QUALITY CONTROL

- A. Testing: Test and inspect piles according to PCI MNL-116.
- B. Piles will be considered defective if they do not pass tests and inspections.

PART 3 - EXECUTION**3.1 DRIVING PILES**

- A. General: Continuously drive piles to elevations or penetration resistance indicated. Establish and maintain axial alignment of leads and piles before and during driving.
- B. Heaved Piles: Redrive heaved piles to tip elevation at least as deep as original tip elevation with a driving resistance at least as great as original driving resistance.

- C. Driving Tolerances: Drive piles without exceeding the following tolerances, measured at pile heads:
 - 1. Location: 4 inches from location indicated after initial driving, and 6 inches after pile driving is completed.
 - 2. Plumb: Maintain 1 inch in 48 inches from vertical, or a maximum of 4 inches, measured when pile is aboveground in leads.
- D. Withdraw damaged or defective piles and piles that exceed driving tolerances, and install new piles within driving tolerances.
- E. Cut off tops of driven piles square with pile axis and at elevations indicated.
- F. Pile-Driving Records: Maintain accurate driving records for each pile, compiled and attested to by a qualified professional engineer.

3.2 FIELD QUALITY CONTROL.

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
 - 1. Dynamic Pile Testing: High-strain dynamic monitoring shall be performed and reported according to ASTM D4945 during initial driving and during restriking on three single piles at the locations shown on the plan drawings. Perform dynamic load tests to evaluate any or all of the following.
 - a. Evaluate suitability of Contractor's driving equipment, including hammer, cap block, pile cushion, and any proposed follower.
 - b. Determine pile axial and lateral capacities.
 - c. Determine energy transfer to pile.
 - d. Evaluate pile installation problems.
 - 2. Allow the engineer one working day after driving the dynamic load tested piles for the Engineer to complete the signal matching analyses and determine the driving criteria for the subsequent piles.
 - 3. Low-strain integrity measurement shall be performed and reported for each pile..
- C. Piles will be considered defective if they do not pass tests and inspections.

END OF SECTION 316213

PART 1 - GENERAL**1.1 SUMMARY**

- A. Section Includes:
1. Structural steel.
 2. Shrinkage-resistant grout.

1.2 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in ANSI/AISC 303-16 AND ANSI/AISC 360-16.

1.3 ACTION SUBMITTALS

- A. Product Data:
1. Structural steel materials.
 2. High-strength, bolt-nut-washer assemblies.
 3. Threaded rods.
 4. Forged-steel hardware.
 5. Shrinkage-resistant grout.
- B. Shop Drawings: Show fabrication of structural-steel components.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Mill test reports for structural-steel materials, including chemical and physical properties.
- C. Source quality-control reports.
- D. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category BU or is accredited by the IAS Fabricator Inspection Program for Structural Steel (Acceptance Criteria 172).
- B. Installer Qualifications: A qualified Installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.

- C. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.1/D1.1M.

PART 2 - PRODUCTS**2.1 PERFORMANCE REQUIREMENTS**

- A. Comply with applicable provisions of the following specifications and documents:
 - 1. ANSI/AISC 303.
 - 2. ANSI/AISC 360.
 - 3. RCSC's "Specification for Structural Joints Using High-Strength Bolts."
- B. Connection Design Information:
 - 1. Option 1: Connection designs have been completed and connections indicated on the Drawings.
- C. Moment Connections: Type FR, fully restrained.
- D. Construction: Moment frame

2.2 B

- A. W-Shapes: ASTM A588, Grade A, weathering steel.
- B. Channels: ASTM A588, Grade A, weathering steel.
- C. Plate and Bar: ASTM A588, Grade A, weathering steel.
- D. Hollow Structural Sections (HSS): ASTM A847, weathering steel.
- E. Welding Electrodes: Comply with AWS requirements.

2.3 BOLTS AND CONNECTORS

- A. High-Strength A325 Bolts, Nuts, and Washers: Grade A325 Type 3, heavy-hex weathering steel structural bolts; ASTM A563, Grade C3, heavy-hex atmospheric corrosion steel nuts; and ASTM F436/F436M, Type 3, hardened weathering steel washers; all with plain finish.
- B. High-Strength A490 Bolts, Nuts, and Washers: Grade A490 Type 3, heavy-hex weathering steel structural bolts; ASTM A563, Grade C3, heavy-hex atmospheric corrosion steel nuts; and ASTM F436/F436M, Type 3, hardened weathering steel washers; all with plain finish.

2.4 RODS

- A. Threaded Rods: ASTM A325 Type 3 weathering steel threaded rod

1. Finish: Plain

2.5 SHRINKAGE-RESISTANT GROUT

- A. Metallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, metallic aggregate grout, mixed with water to consistency suitable for application and a 30-minute working time.
- B. Nonmetallic, Shrinkage-Resistant Grout: ASTM C1107/C1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive and nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate in accordance with ANSI/AISC 303 and to ANSI/AISC 360.

2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for type of bolt and type of joint specified.
 1. Joint Type: Pretensioned
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform shop tests and inspections.
 1. Allow testing agency access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
 2. Bolted Connections: Inspect and test shop-bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
 3. Welded Connections: Visually inspect shop-welded connections in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - a. Liquid Penetrant Inspection: ASTM E165/E165M.
 - b. Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - c. Ultrasonic Inspection: ASTM E164.
 - d. Radiographic Inspection: ASTM E94/E94M.
 4. Prepare test and inspection reports.

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and in accordance with ANSI/AISC 303 and ANSI/AISC 360.
- B. Baseplates, Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Pretension 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 shrinkage-resistant grout solidly between bearing surfaces and plates, so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure.
- C. Maintain erection tolerances of structural steel within ANSI/AISC 303.

3.3 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts" for bolt and joint type specified.
 - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
 - 1. Comply with ANSI/AISC 303 and ANSI/AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.

SECTION 51200

STRUCTURAL STEEL FRAMING
(WEATHERING STEEL)

1. Bolted Connections: Inspect bolted connections in accordance with RCSC's "Specification for Structural Joints Using High-Strength Bolts."
2. Welded Connections: Visually inspect field welds in accordance with AWS D1.1/D1.1M.
 - a. In addition to visual inspection, test and inspect field welds in accordance with AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
 - 1) Liquid Penetrant Inspection: ASTM E165/E165M.
 - 2) Magnetic Particle Inspection: ASTM E709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
 - 3) Ultrasonic Inspection: ASTM E164.
 - 4) Radiographic Inspection: ASTM E94/E94M.

END OF SECTION 051200

PART 1 - GENERAL**1.1 SUMMARY****A. Section Includes:**

1. Roof deck.

1.2 ACTION SUBMITTALS**A. Product Data:**

1. Roof deck.

B. Shop Drawings:

1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.3 INFORMATIONAL SUBMITTALS**A. Certificates:**

1. Welding certificates.
2. Product Certificates: For each type of steel deck.

B. Test and Evaluation Reports:

1. Product Test Reports: For tests performed by a qualified testing agency, indicating that power-actuated mechanical fasteners comply with requirements.
2. Research Reports: For steel deck, from ICC-ES showing compliance with the building code.

C. Field Quality-Control Submittals:

1. Field quality-control reports.

D. Qualification Statements: For welding personnel.**1.4 QUALITY ASSURANCE****A. Qualifications:**

1. Welding Qualifications: Qualify procedures and personnel in accordance with SDI QA/QC and the following welding code:

- a. AWS D1.3/D1.3M.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. 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 PERFORMANCE REQUIREMENTS**

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck in accordance with AISI S100.

2.2 ROOF DECK

- A. Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with SDI RD and with the following:
 - 1. Prime-Painted Steel Sheet: ASTM A1008/A1008M, Structural Steel (SS), Grade 33 minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
 - a. Color: Manufacturer's standard.
 - 2. Deck Profile: B-Deck.
 - 3. Profile Depth: 1-1/2 inches.
 - 4. Design Uncoated-Steel Thickness: As indicated.
 - 5. Span Condition: Double span.
 - 6. Side Laps: Overlapped or interlocking seam at Contractor's option.

2.3 ACCESSORIES

- A. Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 (4.8-mm) minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.

- F. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

PART 3 - EXECUTION**3.1 INSTALLATION, GENERAL**

- A. Install deck panels and accessories in accordance with SDI C, SDI NC, and SDI RD, as applicable; manufacturer's written instructions; and requirements in this Section.
- B. Install temporary shoring before placing deck panels if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- 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. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install in accordance with deck manufacturer's written instructions.

3.2 INSTALLATION OF ROOF DECK

Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:

- 1. Weld Diameter: 5/8 inch
 - 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 12 inches apart in Zone 1 and 6 inches apart in Zones 2 and 3, based on roof-area definitions in FM Global Loss Prevention Data Sheet 1-28.
- B. Side-Lap and Perimeter Edge Fastening:** Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of one-half of the span or 18 inches and as follows:
- 1. Mechanically fasten with self-drilling, No. 10 (4.8-mm-) diameter or larger, carbon-steel screws.

2. Mechanically clinch or button punch.
- 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 (50 mm) minimum.
- D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels in accordance with deck manufacturer's written instructions. Mechanically fasten to substrate to provide a complete deck installation.
 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive in accordance with manufacturer's written instructions to ensure complete closure.

3.3 REPAIR

- A. Repair Painting:
 1. Wire brush and clean rust spots, welds, and abraded areas on both surfaces prime-painted deck immediately after installation, and apply repair paint.
 2. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.

3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- B. Tests and Inspections:
 1. Steel decking will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

END OF SECTION 053100

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 tube reinforcement for low 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 ships' ladders.
6. Metal floor plate and supports.
7. Miscellaneous steel trim including steel angle corner guards and steel edgings.
8. Metal bollards.
9. Pipe Downspout guards.
10. Abrasive metal nosings treads and thresholds.
11. Metal downspout boots.
12. Loose bearing and leveling plates for applications where they are not specified in other Sections.

B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

C. Related Requirements:

1. Section 033000 "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts, and other items cast into concrete.
2. Section 051200 "Structural Steel Framing."
3. Section 055100 "Metal Stairs" for cast and extruded treads and nosings.

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 metal fabrications that are anchored to or that receive other work. 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 ACTION SUBMITTALS

- A. **Product Data:** For the following:
 1. Nonslip aggregates and nonslip-aggregate surface finishes.
 2. Prefabricated building columns.
 3. Metal nosings and treads.
 4. Paint products.
 5. Grout.
- B. **Shop Drawings:** Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items. Provide Shop Drawings for the following:
 1. Steel framing and supports for overhead doors and grilles.
 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 floor plate and supports.

6. Miscellaneous steel trim including steel angle corner guards and steel edgings.
7. Metal bollards.
8. Pipe Downspout guards.
9. Abrasive metal nosings treads and thresholds.
10. Metal downspout boots.

- C. **Delegated-Design Submittal:** For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

- A. **Qualification Data:** For professional engineer.
- B. **Mill Certificates:** Signed by stainless-steel manufacturers, certifying that products furnished comply with requirements.
- C. Welding certificates.
- D. **Paint Compatibility Certificates:** From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- E. **Research/Evaluation Reports:** For post-installed anchors, from ICC-ES.

1.6 QUALITY ASSURANCE

- A. **Welding Qualifications:** Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- B. **Welding Qualifications:** Qualify procedures and personnel according to the following:
1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
 3. AWS D1.6/D1.6M, "Structural Welding Code - Stainless Steel."

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 PERFORMANCE REQUIREMENTS

- A. **Delegated Design:** Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.
- B. **Structural Performance of Aluminum Ladders:** Aluminum ladders, including landings, shall withstand the effects of loads and stresses within limits and under conditions specified in ANSI A14.3.

- C. Structural Performance of Alternating Tread Devices:** Alternating tread devices 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. Alternating Tread Device Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
- D. 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

- A. Metal Surfaces, General:** Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars:** ASTM A 36/A 36M.
- C. Rolled-Steel Floor Plate:** ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- D. Steel Tubing:** ASTM A 500/A 500M, cold-formed steel tubing.
- E. Steel Pipe:** ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- F. 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 as indicated.
 2. Material: Galvanized steel, ASTM A 653/A 653M, structural steel, Grade 33, with G90 coating; nominal thickness.

2.3 FASTENERS

- A. Steel Bolts and Nuts:** Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- B. Steel Bolts and Nuts:** Regular hexagon-head bolts, ASTM A 325, Type 3; with hex nuts, ASTM A 563, Grade C3; and, where indicated, flat washers.
- C. 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.

- D. **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/E 488M, conducted by a qualified independent testing agency.
- E. **Cast-in-Place Anchors in Concrete:** Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- F. **Post-Installed Anchors:** Torque-controlled expansion anchors or chemical anchors.
 - 1. 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.

2.4 MISCELLANEOUS MATERIALS

- A. **Shop Primers:** Provide primers that comply with Section 099113 "Exterior Painting" and Section 099123 Interior Painting."
- B. **Universal Shop Primer:** Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- C. **Water-Based Primer:** Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
 - 1. Products: Subject to compliance with requirements.
- D. **Epoxy Zinc-Rich Primer:** Complying with MPI#20 and compatible with topcoat.
 - 1. Products: Subject to compliance with requirements.
- E. **Shop Primer for Galvanized Steel:** Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.
- F. **Galvanizing Repair Paint:** High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- G. **Bituminous Paint:** Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- H. **Nonshrink, Nonmetallic Grout:** Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- I. **Concrete:** Comply with requirements in Section 03300 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi.

2.5 FABRICATION, GENERAL

- A. **Shop Assembly:** Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. 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.

2.6 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. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
1. Provide bearing plates welded to beams where indicated.
 2. Drill or punch girders and plates for field-bolted connections where indicated.
 3. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches o.c.
- E. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.
1. Unless otherwise indicated, fabricate from Schedule 40 steel pipe.
 2. Unless otherwise indicated, provide 1/2-inch baseplates with four 5/8-inch anchor bolts and 1/4-inch top plates.
- F. Galvanize miscellaneous framing and supports where indicated.
- G. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

2.7 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 and prime shelf angles located in exterior walls.
- D. Prime shelf angles located in exterior walls with zinc-rich primer.
- E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.8 METAL FLOOR PLATE

- A.** Fabricate from rolled-steel floor plate of thickness indicated below:
 - 1.** Thickness: 1/8 inch.
- B.** Provide grating sections where indicated fabricated from welded or pressure-locked steel bar grating. Limit openings in gratings to no more than 1/2 inch in least dimension.
- C.** Provide steel angle supports as indicated.
- D.** Include steel angle stiffeners, and fixed and removable sections as indicated.
- E.** Provide flush steel bar drop handles for lifting removable sections, one at each end of each section.

2.9 MISCELLANEOUS STEEL TRIM

- A.** Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B.** Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.
 - 1.** Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
- C.** Galvanize exterior miscellaneous steel trim.
- D.** Prime exterior miscellaneous steel trim with zinc-rich primer.

2.10 METAL BOLLARDS

- A.** Fabricate metal bollards from Schedule 40 steel pipe.
 - 1.** Cap bollards with 1/4-inch- thick steel plate.
 - 2.** Where bollards are indicated to receive controls for door operators, provide cutouts for controls and holes for wire.
 - 3.** Where bollards are indicated to receive light fixtures, provide cutouts for fixtures and holes for wire.
- 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 pipe or tubing with 1/4-inch- thick 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. Fabricate internal sleeves for removable bollards from Schedule 40 steel pipe or 1/4-inch wall-thickness steel tubing with an OD approximately 1/16 inch less than ID of bollards. Match drill sleeve and bollard for 3/4-inch steel machine bolt.
- E. Prime bollards with zinc-rich primer.

2.11 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 plates.
- C. Prime plates with zinc-rich primer.

2.12 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 zinc-rich primer.

2.13 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.

2.14 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.
- B. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.15 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint

adhesion.

- B. Preparation for Shop Priming Galvanized Items: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with metallic phosphate process.
- C. 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 universal shop primer unless indicated.
- D. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning." requirements indicated below:
 - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Items Indicated to Receive Primers Specified in Section 09960 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- E. 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.

2.16 ALUMINUM FINISHES

- A. As-Fabricated Finish: AA-M12.
- B. Clear Anodic Finish: AAMA 611, Class I, AA-M12C22A41.

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 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.

B. Anchor supports for ceiling hung toilet partitions operable partitions overhead doors and overhead grilles securely to, and rigidly brace from, building structure.

C. Support steel girders on solid grouted masonry, concrete, or steel pipe columns. Secure girders with anchor bolts embedded in grouted masonry or concrete or with bolts through top plates of pipe columns.

1. Where grout space under bearing plates is indicated for girders supported on concrete or masonry, install as specified in "Installing Bearing and Leveling Plates" Article.

D. Install pipe columns on concrete footings with grouted baseplates. Position and grout column baseplates as specified in "Installing Bearing and Leveling Plates" Article.

1. Grout baseplates of columns supporting steel girders after girders are installed and leveled.

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 or anchor bolts. 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 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.
- E. Anchor internal sleeves for removable bollards in concrete by inserting in pipe sleeves preset into concrete or formed or core-drilled holes not less than 8 inches deep and 3/4 inch larger than OD of sleeve. Fill annular space around internal sleeves solidly with nonshrink grout; mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward internal sleeve.
- F. Anchor internal sleeves for removable bollards in place with concrete footings. Center and align sleeves in holes 3 inches above bottom of excavation. Place concrete and vibrate or tamp for consolidation. Support and brace sleeves in position until concrete has cured.
- G. Place removable bollards over internal sleeves and secure with 3/4-inch machine bolts and nuts. After tightening nuts, drill holes in bolts for inserting padlocks. Owner furnishes padlocks.
- H. Fill bollards solidly with concrete, mounding top surface to shed water.
 - 1. Do not fill removable bollards with concrete.

3.4 INSTALLING PIPE GUARDS

- A. Provide pipe guards at exposed vertical pipes in parking garage where not protected by curbs or other barriers. Install by bolting to wall or column with expansion anchors. Provide four 3/4-inch bolts at each pipe guard. Mount pipe guards with top edge 26 inches above driving surface.

3.5 INSTALLING NOSINGS, TREADS, AND THRESHOLDS

- A. Center nosings on tread widths unless otherwise indicated.
- B. For nosings embedded in concrete steps or curbs, align nosings flush with riser faces and level with tread surfaces.
- C. Seal thresholds exposed to exterior with elastomeric sealant complying with Section 079200 "Joint Sealants" to provide a watertight installation.

3.6 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 nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.7 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 painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
 - 1.** Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. Touchup Painting:** Clean and touchup painting of field welds, bolted connections, and abraded areas of shop paint.
- C. Galvanized Surfaces:** Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION

SECTION 055100

METAL 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. Steel tube railings attached to metal stairs.
3. Steel tube handrails attached to walls adjacent to metal stairs.
4. Railing gates at the level of exit discharge.

B. Related Sections:

1. Division 03 Section "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
2. Division 05 Section "Metal Fabrications" for metal treads and nosings installed at locations other than in metal stairs.

1.3 PERFORMANCE REQUIREMENTS

- A. **Delegated Design:** Design metal stairs, including comprehensive engineering analysis by a qualified Professional Engineer registered in the State of Florida, using performance requirements and design criteria indicated.
- 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/240 or 1/4 inch, whichever is less.
- C. **Structural Performance of Railings:** Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Handrails and Top Rails of Guards:
 - a. Uniform load of 50 lbf/ ft. 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.

1.4 ACTION SUBMITTALS

- A. **Product Data:** For metal stairs and the following:
 1. Prefilled metal-pan stair treads.
 2. Nonslip aggregates and nonslip-aggregate finishes.
 3. Abrasive nosings.
 4. Paint products.
 5. Grout.
- B. **Shop Drawings:** Include plans, elevations, sections, details, and attachments to other work.
- C. **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.

1.5 INFORMATIONAL SUBMITTALS

- A. **Qualification Data:** For qualified professional engineer.
- B. Welding certificates.
- C. **Paint Compatibility Certificates:** From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.
- D. **Product Test Reports:** Based on evaluation of comprehensive tests performed by a qualified testing agency, for stairs and railings.
 1. Test railings according ASTM E 894 and ASTM E 935.

1.6 QUALITY ASSURANCE

- A. **Installer Qualifications:** Fabricator of products.
- B. **NAAMM Stair Standard:** Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.

1. Preassembled Stairs: Commercial class.
- C. **Welding Qualifications:** Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- D. **Welding Qualifications:** Qualify procedures and personnel according to the following:
 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 2. AWS D1.3, "Structural Welding Code - Sheet Steel."

1.7 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 metal stairs. 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. Coordinate locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

- A. **Metal Surfaces, General:** Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

2.2 FERROUS METALS

- A. **Steel Plates, Shapes, and Bars:** ASTM A 36/A 36M.
- B. **Steel Tubing:** ASTM A 500 (cold formed).
- C. **Rolled-Steel Floor Plate:** ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- D. **Abrasive-Surface Floor Plate:** Steel plate with abrasive granules rolled into surface.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. IKG Industries, a division of Harsco Corporation; Mebac.
 - b. SlipNOT Metal Safety Flooring, a W. S. Molnar company; SlipNOT.

- E. Steel Bars for Grating Treads: ASTM A 36/A 36M or steel strip, ASTM A 1011/A 1011M or ASTM A 1018/A 1018M.
- F. Wire Rod for Grating Crossbars: ASTM A 510.

2.3 ABRASIVE NOSINGS

- A. **Cast-Metal Units:** Cast aluminum, with an integral abrasive, as-cast finish consisting of aluminum oxide, silicon carbide, or a combination of both. Fabricate units in lengths necessary to accurately fit openings or conditions.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. American Safety Tread Co., Inc.
 - b. Balco Inc.
 - c. Barry Pattern & Foundry Co., Inc.
 - d. Granite State Casting Co.
 - e. Safe-T-Metal Company, Inc.
 - f. Wooster Products Inc.
 - 2. Configuration: Cross-hatched units, 4 inches wide without lip.
 - 3. Configuration: Cross-hatched angle-shaped units, same depth as bar-grating treads and 1 to 1-1/2 inches wide.
- 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.
- D. Apply clear lacquer to concealed surfaces of extruded units set into concrete.

2.4 FASTENERS

- A. **General:** Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941, Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.
- B. **Bolts and Nuts:** Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. **Anchor Bolts:** ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563; and, where indicated, flat washers.
 - 1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for exterior stairs.
- D. **Machine Screws:** ASME B18.6.3.
- E. **Lag Screws:** ASME B18.2.1.

- F. **Plain Washers:** Round, ASME B18.22.1.
- G. **Lock Washers:** Helical, spring type, ASME B18.21.1.
- H. **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 E 488, conducted by a qualified independent testing agency.
 - 1. 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.

2.5 MISCELLANEOUS MATERIALS

- A. **Welding Rods and Bare Electrodes:** Select according to AWS specifications for metal alloy welded.
- B. **Low-Emitting Materials:** Paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. **Shop Primers:** Provide primers that comply with Division 09 painting Sections.
- D. **Universal Shop Primer:** Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
 - 1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- E. **Epoxy Zinc-Rich Primer:** Complying with MPI#20 and compatible with topcoat.
 - 1. Products: Subject to compliance with requirements.
- F. **Galvanizing Repair Paint:** High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- G. **Bituminous Paint:** Cold-applied asphalt emulsion complying with ASTM D 1187.
- H. **Non-shrink, Nonmetallic Grout:** Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- I. **Concrete Materials and Properties:** Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.
- J. **Nonslip-Aggregate Concrete Finish:** Factory-packaged abrasive aggregate made from fused, aluminum-oxide grits or crushed emery; rustproof and non-glazing; unaffected by freezing, moisture, or cleaning materials.

- K. Welded Wire Fabric:** ASTM A 185/A 185M, 6 by 6 inches, W1.4 by W1.4, unless otherwise indicated.

2.6 PRECAST CONCRETE TREADS

- A. Concrete Materials and Properties:** Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 5000 psi and a total air content of not less than 4 percent or more than 6 percent.
- B. Reinforcing Wire Fabric:** Galvanized, welded wire fabric, 2 by 2 inches by 0.062-inch-diameter wire; comply with ASTM A 185/A 185M and ASTM A 82/A 82M, except for minimum wire size.

2.7 FABRICATION, GENERAL

- A.** Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
 - 1. Join components by welding unless otherwise indicated.
 - 2. Use connections that maintain structural value of joined pieces.
 - 3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.
- B.** Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C.** Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D.** Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E.** 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 Type 1 welds: no evidence of a welded joint.

- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.
- H. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.8 STEEL-FRAMED STAIRS

- A. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Alfab, Inc.
 - 2. American Stair, Inc.
 - 3. Sharon Companies Ltd. (The).
- B. **Stair Framing:**
 - 1. Fabricate stringers of steel plates or channels.
 - a. Provide closures for exposed ends of channel stringers.
 - 2. Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements.
 - 3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.
 - 4. Where stairs are enclosed by gypsum board shaft-wall assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be 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, sub-tread pans, and sub-platforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch.
 - 1. Steel Sheet: Galvanized-steel sheet, where indicated.
 - 2. Directly weld metal pans to stringers; locate welds on top of sub-treads where they will be concealed by concrete fill. Do not weld risers to stringers.
 - 3. Attach risers and sub-treads 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.
 - 4. Shape metal pans to include nosing integral with riser.
 - 5. Attach abrasive nosings to risers.
 - 6. At Contractor's option, provide stair assemblies with metal-pan sub-treads filled with reinforced concrete during fabrication.
 - 7. Provide sub-platforms of configuration indicated or, if not indicated, the same as sub-treads. Weld sub-platforms to platform framing.

- a. **Smooth Soffit Construction:** Construct subplatforms with flat metal under surface to produce smooth soffits.
- D. **Abrasive-Coating-Finished, Formed-Metal Stairs:** Form risers, treads, and platforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.097 inch.
 - 1. Steel Sheet: Uncoated hot-rolled steel sheet unless otherwise indicated.
 - 2. Directly weld risers and treads to stringers; locate welds on underside of stairs.
 - 3. Provide platforms of configuration indicated or, if not indicated, the same as treads. Weld platforms to platform framing.
 - 4. Finish tread and platform surfaces with manufacturer's standard epoxy-bonded abrasive finish.

2.9 STAIR RAILINGS

- A. Comply with applicable requirements in Division 05 Section "Pipe and Tube Railings."
 - 1. Fabricate newels of square steel tubing and provide newel caps of pressed steel, as shown.
 - 2. Rails may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
 - 3. Connect posts to stair framing by direct welding unless otherwise indicated.
- B. **Steel Tube Railings:** Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
 - 1. Rails and Posts: 1-5/8-inch- diameter top and bottom rails and 1-1/2-inch- square posts.
 - 2. Picket Infill: 1/2-inch- square pickets spaced less than 4 inches clear.
 - 3. Intermediate Rails Infill: 1-5/8-inch- diameter intermediate rails spaced less than 12 inches clear.
 - 4. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with cam-type, self-closing hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.
- C. **Welded Connections:** Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
 - 1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
- D. Form changes in direction of railings as follows:
 - 1. As detailed.
 - 2. By bending or by inserting prefabricated elbow fittings.
 - 3. By flush bends or by inserting prefabricated flush-elbow fittings.
 - 4. By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.

- 5. By inserting prefabricated elbow fittings of radius indicated.
- E. Form simple and compound curves by bending members in 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.
- F. Close exposed ends of railing members with prefabricated end fittings.
- G. 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.
- H. **Brackets, Flanges, Fittings, and Anchors:** Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
 - 1. Connect posts to stair framing by direct welding unless otherwise indicated.
 - 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.
- I. **Fillers:** Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

2.10 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal stairs after assembly.
- C. **Galvanizing:** Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
 - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
 - 2. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- D. **Preparation for Shop Priming:** Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 1. Exterior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 2. Interior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
 - 3. Interior Stairs: SSPC-SP 3, "Power Tool Cleaning."

- E. 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.
 - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. **Fastening to In-Place Construction:** Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. 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.
- 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. 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.
- F. **Field Welding:** Comply with requirements for welding in "Fabrication, General" Article.
- G. Place and finish concrete fill for treads and platforms to comply with Division 03 Section "Cast-in-Place Concrete."
 - 1. Install abrasive nosings with anchors fully embedded in concrete. Center nosings on tread width.
- H. Install precast concrete treads with adhesive supplied by manufacturer.

3.2 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.
- B. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, 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 nonmetallic, nonshrink grout unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 INSTALLING RAILINGS

- A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:
1. Anchor posts to steel by welding directly to steel supporting members.
 2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with postinstalled anchors and bolts.
- B. Attach handrails to wall with wall brackets. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt. Provide bracket with 1-1/2-inch clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as required to comply with performance requirements.
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 wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.
 4. For steel-framed partitions, use hanger or lag bolts set into fire-retardant-treated wood backing between studs. Coordinate with stud installation to locate backing members.
 5. For steel-framed partitions, use self-tapping screws fastened to steel framing or to concealed steel reinforcements.
 6. For steel-framed partitions, use toggle bolts installed through flanges of steel framing or through concealed steel reinforcements.

3.4 ADJUSTING AND CLEANING

- A. **Touchup Painting:** Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
1. Apply by brush or spray to provide a minimum 2.0-mil dry film thickness.
- B. **Touchup Painting:** Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections.
- C. **Galvanized Surfaces:** Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

PART 1 - GENERAL

1.1 SUMMARY

- A. The Work covered under this section shall consist of manufacturing and / or supplying of the prefabricated floating docks, gangways, pile guides, cleats, fendering, utility routing / anchorage system and other marine hardware and accessories as may be shown or enumerated on the Drawings. This Section Includes:
 - 1. Floating Dock System
 - 2. Walkway Ramps.

1.2 ACTION SUBMITTALS

- A. Shop Drawings:
 - 1. Contractor shall submit detailed design calculations and construction drawings, including but not limited to:
 - a. Layout plan of the dock
 - b. Detail and sectional drawings of all components of the dock system, including, but not limited to, walkway ramps, pipe anchors, cleats, etc.
 - c. All drawings shall be sealed by a Registered Professional Engineer licensed to practice in the State of Florida.

1.3 QUALITY ASSURANCE

- A. General:
 - 1. The deck and frame structural components of fixed piers, floating docks and gangways shall be designed with minimum safety factors on working stress which conform to those set forth in the latest edition of the Aluminum Association 'Specifications for Aluminum Structures' for buildings and similar type structures. The installing contractor shall be a qualified Marine Contractor or General Contractor licensed by the appropriate governing agency. The Contractor shall be capable of securing building or construction permits. The manufacturer / supplier shall have a minimum of 5 years continuous experience in commercial pier, dock, or gangway fabrication and may be required to submit a list of previous experience on similar projects. If required, the previous record will be submitted to the Owner or the Owner's representative 10 days prior to the bid opening.
 - 2. The floating dock system shall be completely prefabricated by the manufacturer and delivered ready for field assembly and installation. All finished metallic structural members shall be free from twists, bends, distortions, and open joints. All exposed parts shall be free of sharp edges and burns. Ends and edges to be rounded or beveled. All

welding shall conform with the requirements of the American Welding Society. Openings between deck and adjacent modules shall not exceed 1/2 inch.

1.4 WARRANTY

- A. General contractors' warranty of one year from the date of substantial completion and in accordance with general requirements.
- B. All structural frames and flotation devices shall have a warranty of eight (8) years from the date of substantial completion. The float and its flotation material shall be 100% warranted against stinking, becoming waterlogged, cracking, peeling, fragmenting, or losing beads.

1.5 DESIGN LOAD CONDITIONS

- A. Dead loads shall consist of the entire weight of the floating structure including all accessories and appurtenances.
- B. Aluminum decked floating docks shall be designed to withstand a minimum uniform live load of 30 pounds per square foot applied vertically. The flotation shall be sized to provide a minimum freeboard of 8 inches under a dead load plus concentrated load of 400 pounds applied at any location on the dock walking surface and shall provide a minimum of 20 inches free board under dead load only. Additional flotation shall be added to support the gangway loads without creating undue distortion in the dock. Flotation shall be linear.
- C. Gangways shall be designed to withstand a minimum uniform live load of 50 pounds per square foot applied vertically. Allowable deflection shall be a maximum of $L/180$ where 'L' is the length of the gangway in inches.
- D. Handrails shall be a minimum of 42" in height above the finished walking surface and designed for a 250-pound load applied in any direction and at any point along the handrail.
- E. The extruded ribbed decking shall be designed to withstand a combined dead load and live load of 100 pounds per square foot per individual slat. Allowable deflection shall be $L/180$ where 'L' is the free span between crossmembers in inches.
- F. Cleats shall be designed to withstand a mooring line load of 1500 pounds in any direction.
- G. Hinged or bolted floating dock module connectors shall be able to withstand a load of 3000 pounds applied to the full connector.
- H. Anchoring devices for floating docks shall allow free movement of the dock, while minimizing damage due to normal dock movement caused by tides, boat wakes, water fluctuation and seasonal winds. Anchoring devices shall be of sufficient number to restrain a uniform lateral force of 150 pounds per linear foot applied along the entire length of the dock.
- I. Utility lines shall meet all governing construction and fire codes. All electrical lines, junction boxes and accessories shall be installed with strict adherence to the latest edition of the National Electrical Code.

PART 2 - PRODUCTS

2.1 MATERIALS & EQUIPMENT

- A. Structural frame and other structural parts: All floating units shall have a structural metal frame to which the flotation, decking, connectors, and anchorage shall be attached.
 - 1. Structural frames for bridges, gangways, ramps, and floating units shall be of all welded construction. Welding shall conform to the requirement of the latest edition of the American Welding Society (AWS) Specifications.
 - 2. Aluminum extrusions for pier, dock and gangway structures shall be aluminum alloy 6061-T6. Alloy 6061-T6 shall be extruded in accordance with the requirements of applicable sections of Federal Specification QQ-A-200.
 - 3. Floats shall be constructed with a fully welded aluminum frame with a solid polyurethane foam core. Polystyrene foam is not acceptable for use.
 - 4. Side mounted vinyl bumpers shall be comprised of non-marring, non-yellowing marine grade extruded vinyl, installed with aluminum pop rivets on metal docks over a 1x8 composite fender attached to the aluminum frame.
 - 5. Cleats shall be composed of ALMAG 35 cast aluminum alloy meeting the requirements of the Federal Specification QQ-A-571F and QQ-A-601E.
 - 6. Stainless steel bolts, rods, nuts, washers, and screws shall be type 304.
 - 7. Rollers for either pile guides or gangways shall be UHMW polyurethane with black ultra-violet light inhibitor added.
 - 8. All rebar and cable shall be epoxy coated to retard corrosion.

- B. Anchorage of the floating structure shall consist of telescoping pipes arranged with the larger pipes adequately braced to the dock unit with structural steel (hot-dipped galvanized after welding), or aluminum alloy. The inner section shall be firmly imbedded into the lake bottom. The telescoping spuds shall be sized for typical water surface elevation and maximum fluctuation, with the bottom sections equipped with an auger welded to the ends. In some instances, where the water fluctuation of water depths will allow, non-telescoping poles may be used. In those instances, the top of the poles shall all be cut to the same elevation and a cap supplied by the manufacturer shall be provided on top of the pole.

- C. Vinyl fender shall be installed over composite fender and secured with aluminum pop rivets at not more than 6-inch intervals along the top and 12-inch intervals along the bottom. Heavy duty vinyl corner fenders shall be installed in the locations and as detailed on the plans.

- D. **Transfer Railing:**
 - 1. The floating dock shall be equipped with a transfer railing system manufactured for disabled access and supplied by the dock manufacturer. This system shall consist of a rotating 1-1/2" diameter pipes and clamps to allow for disabled users to transfer from the

dock into a boat or kayak. Transfer system shall be identified in the shop drawings for placement approval.

E. Transfer Slide Bench:

- 1.** The floating dock shall be equipped with a transfer slide bench manufactured for disabled access and supplied by the dock manufacturer. The transfer bench shall be built with at least two (2) heights for easy transfer from wheelchairs of varying sizes and two (2) transfer slide boards to accommodate differing watercraft heights. The transfer slide boards shall land securely on a railing system that stabilizes the slide board and provides grab bar assistance for easy side movement.

PART 3 - EXECUTION

3.1 FABRICATION REQUIRMENTS

- A.** Fixed pier units shall be sequentially numbered, match drilled and bolted in the shop prior to shipment. All joints are to be MIG welded except handrail joints which must be TIG welded.
- B.** Aluminum decked floating docks shall be sequentially numbered with welded hinge mount extrusions that are matched in the shop, prior to shipment. Cleats and other accessories shall be welded or bolted as shown on the plans. Vinyl fendering shall be installed in the shop. Floats may be detached for easier unloading and shipping.
- C.** Gangways shall be securely fasted to the fixed structure. This connection shall be designed by the manufacturer's licensed professional engineer.
- D.** General Contractor shall coordinate with the Architect and Engineer of Record's design drawings. Floating docks and gangways may have lighting, which will be attached to the gangway and / or floating structure. Attachment and mounting brackets for these lights will be by the manufacturer's professional engineer.

3.2 CONSTRUCTION REQUIREMENTS

- A.** Aluminum decked floating docks shall be anchored with pile guides or other anchoring devices bolted to the aluminum frame. Floating docks must move freely during the entire cycle of water level extremes with the normal expected wind condition. Utility lines must be installed to function during normal expected water level and weather extremes.
- B.** Gangways shall be securely fastened to the wall or fixed structure shown on the plans. Utilities running on the gangway shall be installed so as not to interfere with the access area of the gangway or to be damaged during normal construction.

The connection of the gangway to the fixed structure shall meet all requirements of the Americans with Disabilities Act (ADA), including the Florida Accessibility Code in effect at the time of construction. There shall be no unlevel transition between the fixed structure and the gangway. Maximum threshold shall be 1/2."

SECTION 05 52 00

ALUMINUM FLOATING DOCKS AND GANGWAYS

END OF SECTION

PART 1 - GENERAL**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Wood blocking, cants, and nailers.
 - 2. Roof sheathing.
 - 3. Wood furring and grounds.
 - 4. Plywood backing panels.

1.3 DEFINITIONS

- A. Rough Carpentry: Carpentry work not specified in other Sections and not exposed, unless otherwise indicated.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NELMA - Northeastern Lumber Manufacturers Association.
 - 2. NLGA - National Lumber Grades Authority.
 - 3. RIS - Redwood Inspection Service.
 - 4. SPIB - 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, net amount of preservative retained, and chemical treatment manufacturer's written instructions for handling, storing, installing, and finishing treated material.
 - 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, both before and after exposure to elevated temperatures when tested according to ASTM D 5516 and ASTM D 5664.

3. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 4. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
1. Preservative-treated wood.
 2. Fire-retardant-treated wood.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- B. Source Limitations for Fire-Retardant-Treated Wood: Obtain each type of fire-retardant-treated wood product through one source from a single producer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber, plywood, and other panels; place spacers between each bundle to provide air circulation. 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 lumber grading agencies certified by the American Lumber Standards Committee Board of Review.
1. Factory mark each piece of lumber with grade stamp of grading agency.
 2. 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.
 3. Provide dry lumber with 19 percent maximum moisture content at time of dressing for 2-inch nominal thickness or less, unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWWA C2 (lumber) and AWWA C9 (plywood), except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWWA C31 with inorganic boron (SBX).
1. Preservative Chemicals: Acceptable to authorities having jurisdiction and one of the following:
 - a. Ammoniacal, or amine, copper quat (ACQ).

- b. Ammoniacal copper citrate (CC).
 - c. Copper azole, Type A (CBA-A).
- B. Kiln-dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark each treated item with the treatment quality mark of an inspection agency approved by the American Lumber Standards Committee Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
 - 1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
 - 2. Wood sills, sleepers, blocking, furring, stripping, and similar concealed members in contact with masonry or concrete.
 - 3. Wood framing members less than 18 inches above grade.

2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. Where fire-retardant-treated lumber and plywood are indicated, use materials impregnated with fire-retardant chemicals by a pressure process or other means acceptable to authorities having jurisdiction to produce products with the following fire-test-response characteristics:
 - 1. Flame-spread index of not greater than 25 when tested according to ASTM E 84.
 - 2. Flame-spread index of not greater than 25 when tested according to ASTM E 84 with test continued for a period of 30 minutes with no evidence of significant progressive combustion. Flame front shall not progress more than 10-1/2 feet (3.2 m) beyond centerline of burner at any time during test.
- B. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
- C. Interior, Low-Hygroscopic-Type, Fire-Retardant Treatment: Formulation that results in treated material with an apparent moisture content of not more than 28 percent when tested according to ASTM D 3201 at 92 percent relative humidity.
- D. Mill lumber before treatment and implement special procedures during treatment and drying processes that prevent lumber and plywood from warping and developing discolorations from drying sticks or other causes, marring, and other defects affecting appearance of treated woodwork.
- E. Kiln-dry material after treatment to levels required for untreated material. Do not use material that does not comply with requirements for untreated material or is warped or discolored.

2.4 DIMENSION LUMBER

- A. Provide dimension lumber of grades indicated according to the American Lumber Standards Committee National Grading Rule provisions of the grading agency indicated.

2.5 WOOD PANEL PRODUCTS, GENERAL

- A. Plywood: Comply with DOC PS 1.

2.6 ROOF SHEATHING

- A. Plywood Roof Sheathing:

Unless indicated otherwise on the drawings:

1. Panel Grade: Fire Retardant Treated Sheathing, Structural I.
2. Exposure Durability Classification: Exterior or Exposure 1.
3. Span Rating and Thickness: As indicated or required.
4. Governing Product Standard: PS 1-95, C-D.

2.7 MISCELLANEOUS LUMBER

- A. Provide lumber for support or attachment of other construction, including the following:
 1. Blocking.
 2. Cants.
 2. Nailers.
 3. Furring.
 4. Grounds.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 19 percent maximum moisture content and any of the following species:
 1. Mixed southern pine; SPIB.
 2. Hem-fir or Hem-fir (north); NLGA, WCLIB, or WWPA.
 3. Eastern softwoods; NELMA.
 4. Northern species; NLGA.
 5. Western woods; WCLIB or WWPA.
- C. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.8 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 thick.

2.9 FASTENERS

- A. Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
 - 1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: CABO NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening 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.
- F. Lag Bolts: ASME B18.2.1.
- G. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- H. Expansion Anchors: Anchor bolt and sleeve assembly 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 (interior locations): Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
 - 2. Material (exterior locations): Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough 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. Do not use materials with defects that impair quality of rough carpentry or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- C. Apply field treatment complying with AWWA M4 to cut surfaces of preservative-treated

lumber and plywood.

- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. CABO NER-272 for power-driven fasteners.
 - 2. Published requirements of metal framing anchor manufacturer.
 - 3. Table 2306.1, "Fastening Schedule," in the Standard Building Code.

- E. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; predrill as required.

- F. Blocking and Nailer Installation:
 - 1. Install where indicated and where required for 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.
 - 2. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated. Build anchor bolts into masonry during installation of masonry work. Where possible, secure anchor bolts to formwork before concrete placement.

END OF SECTION

SECTION 07460

CEMENTITIOUS SIDING

PART 1 - GENERAL

1.01 DESCRIPTION

- A. Scope Of The Work:** Furnish and install all siding materials, accessories and work required to complete and provide a finished siding system, as shown on the Drawings.
- B. Related Work Specified Elsewhere:**
 - 1. Section 09900: Painting and Finishing

1.02 WARRANTY

- A.** The General Contractor shall furnish the Owner with the manufacturer's written 50 year limited transferable product warranty.

1.03 JOB CONDITIONS

- A.** Do not install siding if temperature is below 32-degrees.

1.04 PRODUCT HANDLING, DELIVERY AND STORAGE

- A.** Stack sheets on edge or lay flat on a smooth, level surface.
- B.** Protect all edges and corners from chipping.
- C.** Store sheets under cover and keep dry prior to installation to ensure optimum performance.
- D.** Allow sheets which have become wet, to dry thoroughly before installing.

PART 2 - MATERIALS

2.01 SIDING

- A. Panels:**
 - 1. Fiber-cement
 - 2. Size: 5/16-inch thick , 4' widths in lengths as practicable.
 - 3. Finish: Smooth
 - 4. Manufacturer / Product: James Hardie Building Products: Hardipanel
- B. Planks:**
 - 1. Fiber-cement
 - 2. Size: 5/16-inch thick , 8" X 12' exterior lap siding,

3. Finish: Colonial Smooth
4. Manufacturer / Product: James Hardie Building Products: Hardiplank

C. Stops and Trim:

1. Fiber-cement
2. Size: 7/16-inch thick, widths as appropriate for the closure condition.
3. Finish: Smooth
4. Manufacturer / Product: James Hardie Building Products: Hardipanel.

D. Fasteners: Rock-On screws with Climaseal coating, by ITT Build-X.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Cutting:

1. Cut with a power sawing tool or circular saw equipped with dry diamond blade only.
2. Cut siding planks as recommended by the manufacturer.
3. Consult with the manufacturer on avoiding dust inhalation.

B. Panels (in vertical installation):

1. Install horizontally over metal framing.
2. Install in single piece horizontally as practicable.
3. Joints:
 - a. Vertical: Butt joints, to the hair line with batten trim set in sealant occurring at framing members.
 - b. Horizontal: Lap panels 1 1/4" set in sealant.
4. Secure using 1-1/4-inch long self-drilling screws set in sealant to framing.
5. Countersink screws flush with the plane of the plank.

C. Planks:

1. Install horizontally over metal hat channels, placed 24-inches on center, over masonry exterior walls.
2. Overlap planks a minimum of 1-1/4-inch, as recommended by the manufacturer.
3. Install planks with butt joints, to the hair line, staggered randomly on those planes exceeding 12'-0" in length, a minimum of 2-foot intervals when located in the same wall cavity.
4. Caulk each butt joint to occur at furring channels.
5. Secure planks using screws to furring using 1-1/4-inch long self-drilling Rock-On screws with Climaseal coating, by ITT Build-X.
6. Countersink screws flush with the plane of the plank allowing the lap to conceal the fasteners in the previous course.
7. Locate all joints a minimum of two furring cavities from wall corner.
8. Locate successive splices within the same plank course no closer than 48 inches from

each other.

3.02 FINISHING

- A.** Factory Finish utilizing ColorPlus Technology by James Hardie.
 - 1. Process:
 - a. Factory applied finish by fiber cement manufacturer in a controlled environment within the fiber cement manufacturer's own facility utilizing a multi-coat, heat cured finish within one manufacturing process.
 - b. Each finish color must have documented color match to delta E of 0.5 or better between product lines, manufacturing lots or production runs as measured by photospectrometer and verified by third party.
 - 2. Protection: Factory applied finish protection such as plastic laminate that is removed once siding is installed
 - 3. Accessories: Complete finishing system includes pre-packaged touch-up kit provided by fiber cement manufacturer. Provide quantities as recommended by manufacturer.
 - 4. Color shall be selected by Owner and Architect from Manufacturer's color options.

END OF SECTION

PART 1 - GENERAL**1.1 DESCRIPTION****A. Scope of Work:**

1. Furnish and install all sheet metal roofing materials for both flat mansard panel and curved panel applications including accessories and incidental work required to provide a complete and watertight sheet metal roofing system.
2. Roof support systems and counter-flashings are not included in this Section.

B. Related Work Specified Elsewhere:

1. Section 06 10 00: Rough Carpentry

1.2 QUALITY ASSURANCE**A. Standards:**

1. Have all work done by applicators approved by the manufacturer of the materials and installed in strict accordance with the manufacturer's directions, and all applicable requirements of Factory Mutual Engineering Corporation Standards, Class A, Type I.
2. Conform with the standards set forth in the SMACNA architectural sheet metal manual.
3. Comply with requirements of Factory Mutual Loss Prevention Data 1-29 edition for resistance to wind blow-off in correlation with requirements in applicable building codes, and for Hurricane Resistance as required by the Florida Building Code.

1.3 PERFORMANCE REQUIREMENTS

- A. Air Infiltration: The panel system shall be tested in accordance with ASTM E 1680, and shall exhibit no more than 0.01 cfm/ft² of air infiltration at 20 psf test pressure.
- B. Static Air Pressure Water Infiltration: The panel system shall be tested in accordance with ASTM E 1646, and shall exhibit zero water leakage at 20 psf test with a volume spray of 5 gallons/hour for 15 minutes.
- C. Water Penetration: The panel system shall be tested in accordance with ASTM E 2140-01, and shall exhibit zero leakage when, at dead level, exposed to 6" of water for 6 hours.
- D. Structural Performance: Provide metal roof panel assemblies capable of withstanding the effects of gravity loads and stresses, set forth by ASCE 07 calculations, within the limits and under the conditions indicated, based on testing according to ASTM E 1592

1.4 WARRANTY AND CERTIFICATION

- A. Furnish the Owner with a certified, written statement that metal roofing and attachments and all other conditions have been met as required to produce a bondable or guaranteed roofing

and flashing application, and that it is in compliance with FM or UL classification requirements, all as have been included in these Specifications and/or indicated on the Drawings, or both. System shall be designed, fabricated and installed in accordance with the Florida Building Code, and be so certified by the roofing manufacturer.

- B.** Manufacturer's standard 25 Year No Dollar Limit Warranty weather-tightness warranty. The warranty coverage shall include all flashings, penetrations, underlayment, field applied gutter material, and edge details as part of the weathertightness warranty. The warranty shall clearly list the design wind speed, and will not limit weathertightness and blow off protection up to that speed
- C.** Provide the Owner with the manufacturer's written full 25 year non-prorated warranty, covering cracking, peeling and color fade of metal roofing, flashing and trim, all of which shall be products of the roofing manufacturer.
- D.** Provide a 10-year workmanship guarantee, on the roofing installation and components.

1.5 SUBMITTALS

- A.** Product Data: Submit manufacturer's product information and installation instructions for each item used in roofing installation.
- B.** Shop Drawings: Show roof panel system with flashings and accessories in plan and elevation; sections and details. Include metal thicknesses and finishes, panel lengths, joining details, anchorage details, flashings and special fabrication provisions for termination and penetrations. Indicate relationships with adjacent and interfacing work. Shop drawings to be prepared exclusively by metal roof panel manufacturer.
- C.** Engineering Calculations: Submit negative wind uplift pressure calculations. Calculations shall be sealed by a professional engineer licensed to practice structural engineering in the jurisdiction in which the project is located and employed by the panel system manufacture as a full time permanent employee.

1.6 JOB CONDITIONS

- A.** Weather: Conduct no roofing operations when water in any form is present on the deck, or when materials are damp, wet or likely to become damp or wet by the elements.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

- A.** Innovation Metals Company (IMETCO), Inc., 2070 Steel Drive, Tucker, Georgia 30084-5832, (407)-375-0600
 - 1. Panel Designation: Series 300
 - 2. System: System 316, with 16-inch centers
- B.** ASC Building Products, Inc., 2110 Enterprise Boulevard, West Sacramento, California 956912-3493, (800) 726-2727
 - 1. Panel Designation: KlipRib

- C. Berridge Manufacturing Co., 6515 Fratt Road, Houston, Texas 78218, (800) 669-0009
 - 1. Panel Designation: Tee-Panel
- D. Substitutions to acceptable manufacturer's may be granted upon approval by the Architect. All manufacturers submitted, those listed as the basis of design, along with all others not listed, are subject to full compliance of all specification requirements.

2.2 MATERIALS

- A. Panels:
 - 1. Base Metal: Minimum .040" Aluminum, 3105-H14 aluminum alloy, per ASTM B209.
 - 2. Factory Applied Exterior Painted Finish:
 - a. 2 coat Fluoropolymer or fluorocarbon coating, 1.0 mil dry film thickness equal to Duranar (70% Kynar Resins) by P.P.G. Industries or equal.
 - b. Color: IMETCO; Blue Sapphire (or equal)
- B. Vapor Barrier:
 - 1. Peel and stick self-sealing and self adhering membrane:
 - a. Minimum 40 mil thick.
 - b. Manufacturers /Products:
 - 1. IMETCO (407-375-0600): AquaBlock50
 - 2. W.R. Grace & Co. (800-954-7676): Grace Ice & Water Shield

2.3 DESIGN CRITERIA

- A. Panels:
 - 1. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates, and accessories required for weathertight installation.
 - 2. Standing Seam Panel Height: Minimum 2".
 - 3. Standing Seam Panel Width: Maximum 18" o.c.
 - 4. Provide panels with flush horizontal and vertical surfaces, to facilitate sealing at terminations.
 - 5. Roofing panels shall be certified to be manufactured and installed for compliance with the Florida Building Code.
- B. Fastening System:
 - 1. Secure to supports with a concealed structural fastening system of steel having a protective metallic coating, eliminating all through-penetration of the exposed roofing surface into structural supports.
 - 2. Allow the roof covering to move independently of any differential thermal movement by the fastening system.
 - 3. Design the panel-to-structural clip to accommodate 1-inch of thermal movement in both expansion and contraction.
 - 4. Incorporate a self-centering feature to the clip to assure a 1-inch movement capability

in both directions.

5. Through-penetration of the roofing surface by exposed fasteners may occur only for non-structural connections at panel terminations and roof perimeter flashing locations using stainless steel screws, with weather seal washers.

C. Trim:

1. Provide all required closures of metal; non-metal closures are not acceptable.
2. Design trim to provide for expected movement of roof panels due to thermal expansion and contraction.
3. Finish: match the finish of preformed panels.

D. Sealants: Provide manufacture's recommended sealants in colors to match panels.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Make all subsurfaces free from material projections, dust, loose and foreign materials and any other obstructions, presenting a smooth plane, ready for installation.
- B. Apply no roofing until all vents, pipes, curbs or roof mounted or protruding items have been installed in their final position and the general condition and acceptability of the deck surface to be covered has been determined by examination.
- C. Commencing of roofing application constitutes acceptance of the deck surface by roofing applicator.

3.2 INSTALLATION

- A. Install in strict accordance with manufacturer's specifications and closure details, by following accepted installation practices and approved shop drawings, and to provide a 100% water tight installation.
- B. Install metal roofing panels over one (1) layer of Ice and Water Shield over plywood substrate.
- C. Continuously lock or crimp seams by mechanical means during installation.
- D. Seal panel termination and perimeter flashings (attached to roof panels) with sealants recommended and furnished by the manufacturer.
- E. Remove protective strippable plastic film when and as instructed by metal roof Manufacturer.

3.3 ADJUSTMENT AND CLEANING

- A. Replace all panels damaged as a result of installer's failure to comply with roofing manufacturer's instructions, or any panels which are defective.

END OF SECTION

SECTION 07620

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A.** Work includes Miami-Dade compliance for all flashings and sheet metal work as shown on the drawings and required to provide a watertight building envelope and otherwise as indicated. Installation shall be in compliance with **Miami-Dade** certifications associated with the products being used or being tied into.

1.2 SUBMITTALS

- A. Samples:** Provide 3 color samples for prefinished components.
- B. Shop Drawings:** Provide showing shapes, sizes, and anchoring details for all components.

1.3 QUALITY ASSURANCE

- A. Standards:** Have all work done by applicators approved by the manufacturer of the materials and installed in strict accordance with the manufacturer's directions, and all applicable requirements of Factory Mutual Engineering Corporation Standards, Class A, Type I.

PART 2 - PRODUCTS

2.1 MATERIALS

- A.** Where sheet metal is required and no material or gage is indicated on the drawings, provide the highest quality and gage commensurate with the referenced standards using as minimum, galvanized sheet steel.
- B. Galvanized sheet:** ASTM A93, zinc coated, 1.25 oz per square foot sheet steel.
- C. Aluminum Sheet**
- D. Flexible thermal plastic sheet:** Chlorinated polyethylene.
- E. Accessory Materials And Fasteners:**
 - 1.** Fasteners: Size and type to fit the application.
 - a.** Same material as sheet metal.
 - b.** For attaching copper: Stainless steel
 - 2.** Solder and Flux: Type recommended for the materials being used.
 - 3.** Plastic Cement: ASTM D 2822
 - 4.** Bituminous Paint: Acid and alkali resistant type, black in color.

2. 2 FABRICATIONS

A. General:

1. Fabricate of materials scheduled.
2. If no specific details are required, comply with the recommendations of the "Architectural Sheet Metal Manual" of the Sheet Metal and Air Conditioning Contractors National Association (SMACNA).
3. Separate dissimilar metals from each other by painting each metal surface in the area of contact with a bituminous coating or other permanent separation to preclude electrolysis between the two metals.
4. Provide for thermal expansion on running trim in items exposed for more than 15 feet continuous length at a minimum of one joint every 10 feet.
5. Locate expansion joints within 2 feet of each corner or intersection of sheet metal flashing and trim.
6. Form exposed faces flat and free of buckles, excessive waves and avoidable tool marks, considering the temper and reflectivity of the metal.
7. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
8. Except as otherwise shown, fold back the sheet metal to form a hem on the concealed side of exposed edges.

B. Seams:

1. Finish flat lock seams not less than 1" wide.
2. Finish solder-lap seams not less than 1" wide.
3. Lap unsoldered plain-lap seams not less than 3 inches unless otherwise specified.
4. Make flat seams in the direction of the flow.

C. Miscellaneous Metal Flashings:

1. Perimeter roof edge metal drip flashings: Fabricate from 0.027" aluminum in a color to match adjacent exposed finishes.
2. Pitch Pans: 24 gauge galvanized steel:
 - a. Size:
 - i. Sides: Minimum of 4 inches above roofing membrane.
 - ii. Flanges: Minimum of 4 inches.
 - iii. Area: 2 inches greater in width and length than support it is flashing.

D. Copings:

- a. Provide pre-finished .050 **Aluminum** copings with Kynar coating (Kynar 500 or Hylar 5000), color to match the building exterior finish, from standard manufacturer's colors as determined by the Architect.
- b. Supply coping system complete with hold-down cleats, splice plates and snap-on copings in finishes and color to match coping.
- c. Size each coping according to the wall to which coping is to be attached.
- d. Fabricate copings 3/4-inch larger than the wall size to allow for

membranes and inconsistencies.

E. Concealed Flashings:

- a. Use nominal .020 inch thick flexible flashing membranes for vertical conditions supporting no head of water.
- b. Sealing solvent: Manufacturer's approved bonding liquid.

PART 3 - EXECUTION

3.1 INSTALLATION

- A.** Install metal flashings and trim in strict accordance with manufacturer's specifications and instructions, providing proper expansion joint movement, as detailed in manufacturer's installation data.
- B. Copings:**
 1. Install coping system on compression pad, ensuring that coping is held firmly in place, and to allow installation with no exposed fasteners.
 2. Install splice plates with three beads of non-acid cure silicone caulking, field applied, to each side of the splice plate.

END OF SECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Work includes sealing and caulking where shown on the drawings and required to provide a positive barrier against passage of air and moisture.

B. Related Work Specified Elsewhere:

1. Section 07620: Sheet Metal Flashing and Trim

1.02 GUARANTEE

A. Provide a guarantee period of five (5) years on all sealant installation against joint failure.

B. Joint failure is defined as leaks of air or water; evidence of loss of cohesion, fading of sealant material, migration of sealant, or evidence of loss of adhesion between sealant and joint edge.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Use caulking and sealing compounds of the following kinds, or a combination of both, at Contractor's option.

B. Use primers that are quick-drying, colorless, non-staining sealers of type and consistency as recommended by manufacturer of caulking material for the particular surface involved.

C. Elastomeric Sealants:

1. Polysulfide-based Compound: One component polysulfide liquid polymer base rubber which cures at normal temperature to a flexible film rubber, in gun grade consistency.

2. Butyl-based Compound

a. Smooth flowing, single component, architectural grade, synthetic, general purpose caulking compound, composed of 80-100% solids, butyl, non-oily, non-hardening, curing to a tack-free surface, paintable, in gun grade consistency.

b. Mastic: Butyl-based compound, knife or trowel consistency.

3. Exterior Joint Sealants: Dow PC-790.

D. Acoustical Sealants for use for sealing areas in and around fire/smoke priority walls: Non-flammable, non-drying, non-hardening, non-oil based, non-bleeding permanently flexible acoustical sealant, as manufactured by USG.

- E. Silicone Building Sealant** for use in sealing joint between aluminum window framing and the air barrier, polyurethane liner. Sealant shall be **DOW CORNING 790 Silicone Building Sealant**.

PART 3 - EXECUTION

3.01 INSPECTION

- A.** Examine sub surfaces to receive work and report in writing to the Contractor, with a copy to the Architect, any conditions detrimental to the Work.
- B.** Failure to observe this constitutes a waiver to any subsequent claim to the contrary, and will make this Contractor responsible for any corrections which may be required by the Architect.
- C.** Commencement of the Work will be construed as acceptance of all sub surfaces.

3.02 PREPARATION

- A.** Clean and prepare surfaces to which sealant is to be applied, per manufacturer's recommendations.
- B.** Scrape and wire brush any concrete and similar surfaces as required; all surfaces shall be dry.
- C.** Prime surfaces if required by the manufacturer.

3.03 APPLICATION

- A.** Applied materials shall be in strict accordance with the manufacturer's printed directions; observe manufacturer's requirements regarding temperature control, usability of materials and protection of adjacent surfaces.
- B.** Make sealing surfaces slightly concave, free of wrinkles and skips, uniformly smooth and with perfect adhesion along both sides of joint.
- C.** Protect adjacent surfaces from excess materials; leave joints in a clean, neat condition.
- D.** Defective joints shall be removed, cleaned and replaced at no additional cost to the Owner.

END OF SECTION

SECTION 09900

PAINTING AND FINISHING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work:

1. Work includes painting all surfaces not factory finished, including factory primed items, galvanized items unless schedule otherwise on the drawings.
2. Surface preparation, priming and coats of paint specified are in addition to shop-priming, except as otherwise specified.
3. Items to be painted include but are not limited to all exposed pipes and ducts, hangars, exposed steel and iron work, and primed metal surfaces of equipment installed under the mechanical and electrical work, which are left exposed.
4. Concealed Surfaces:
 - a. Unless otherwise indicated, painting is not required on surfaces such as walls or ceiling in concealed areas and inaccessible areas, furred areas, and pipe spaces.
 - b. All piping, equipment, and other such items in concealed spaces are not required to be painted.
5. Copper, bronze, chromium plate, nickel, stainless steel, aluminum metal, lead and lead coated copper are not to be painted or finished unless specifically scheduled.

1.02 SUBMITTALS

A. Samples:

1. Before work is begun, the Contractor will furnish the Owner with a color schedule of colors selected either from manufacturer's stock colors, or specifically requested color mixes by the Owner.
2. Submit two 8-inch x 8-inch samples of each color on heavy cardboard.
3. Submit sealer and stained finishes on material on which that particular finish is to be used.

1.03 JOB CONDITIONS

A. Protection:

1. Do not paint any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sensing devices, motor and fan shafts, unless otherwise indicated.
2. Do not paint over any code-require labels, such as Underwriters Laboratories and Factory Mutual or any equipment identification, performance rating, name or nomenclature plates.

PART 2 - PRODUCTS

2.01 MATERIALS AND SYSTEMS

- ##### **A. Sherwin Williams** or approved equal, shall be used, with thinning not to exceed

manufacturer's recommendations.

- B.** Paint color shall be as indicated on the Finish Schedule and as chosen by the Owner where not specified.
- C.** Paint material used on this project shall contain minimum certified flame and smoke ratings, depending on the location of the application. Certification of manufacturer's flame and smoke ratings shall be available at the final inspection.
 - 1.** In exit access corridors and accesses to exits shall be minimum Class A, having a flame spread rating of between 0 and 25, and smoke developed index of 0-450, as determined by ASTM-E-84.
 - 2.** In all other areas, minimum Class B, having a flame spread rating of between 26 and 75, and smoke developed index of 0-450, as determined by ASTM-E-84.

PART 3 - EXECUTION

3.01 INSPECTION

- A.** Examine all subsurfaces to receive painting and report in writing to the Contractor, with a copy to the Architect, any conditions detrimental to the Work.
- B.** Failure to observe requirement constitutes a waiver to any subsequent claims to the contrary, and holds Painting Contractor responsible for any corrections which may be required by the Architect.
- C.** Commencement of the Work will be construed as acceptance of all subsurfaces.

3.02 SURFACE PREPARATION

- A.** Protect items not to be painted or remove prior to painting.
- B.** If required to be removed, reposition after painting.
- C.** Make any exposed miscellaneous metal items, such as steel supports, anchors, bucks, hollow metal frames and the like, clean, free of rust, dust, grease or dirt.
- D.** Clean any visible portions of throats of galvanized steel ductwork with solvents, wipe dry with clean rags, and paint flat black.
- E.** Make any wood surfaces to be painted or stained clean, smooth, dry and fully sanded. Knots and pitch pockets under paint finish shall be sealed with shellac.
- F.** Fill joints, cracks, nail holes, disfigurements, etc., with putty after priming, then sand smooth.
- G.** Seal any concrete, masonry, plaster and similar surfaces to be painted and fill to smooth,

even surfaces after neutralizing with a wash of four pounds sulfate or zinc and one gallon of water.

- H. Remove grease and oil with benzine.
- I. Clean thoroughly any wallboard surfaces to be painted.
- J. Spackle any nail holes after priming has dried.
- K. Sand smooth all rough surfaces.
- L. All roof truss members which will be visible through the soffit screen vents shall be painted black.

3.03 WORKMANSHIP

- A. Thoroughly cover with uniform color and finish; the number of coats specified being the minimum, provide any additional coats to produce work satisfactory to the Architect.
- B. **All exposed electrical panel boards, primed hardware, etc., shall be painted to match adjacent surfaces.** (Fire alarm annunciator panels excepted)

3.04 APPLICATION

- A. During interior application, maintain minimum temperature of 65 degrees F unless otherwise directed by manufacturer's printed instructions.
- B. Hold temperature as constant as possible.
- C. Provide adequate ventilation at all times so the humidity cannot rise above the dew point of the coldest surface to be painted.
- D. Paint all exposed surfaces of every member; paint anything inaccessible after installation, before installation, if required to be painted.
- E. Color code and stencil identify mechanical equipment where required in **mechanical specifications**.
- F. **Paint no items fitted with finish hardware until hardware has been temporarily removed. Finish hardware shall not be painted.**
- G. Sand carefully between coats all finishes on smooth surfaces for good adhesion of subsequent coats.
- H. Where coverage is incomplete or not uniform, provide an additional coat at no additional cost to the Owner.
- I. Each succeeding pigmented coat shall be distinguishably lighter than the previous coat.

- J.** Tint all prime and undercoats to a color similar to finish coat.
- K.** Apply putty, caulk or spackle after surface is primed and primer is dry.
- L.** Apply all coatings without reduction except as specified by label instructions, or required by this specification.
- M.** In such cases, reduction shall be the minimum, permitted.

3.05 COMPLETION AND CLEANING

- A.** On completion of the Work, carefully clean all glass, hardware, etc., and remove all misplaced paint and stain spots or spills and leave work in a condition acceptable to the Architect.

3.06 SCHEDULE OF PAINTING

B. Exterior:

- 1.** Exterior Millwork (Other than Pre-Finished Materials):
 - a.** One coat primer, all weather alkyd wood undercoating, exterior or acrylic latex wood primer on cedar material.
 - b.** All wood surfaces thus primed shall receive two (2) coats all weather alkyd house paint.
 - c.** Plywood soffits shall receive one (1) coat in addition to primer.
 - d.** At doorways, all surfaces shall be sanded between coats to assure a smooth, blemish free surface.
- 3.** Galvanized Metal: Wash with galvarep, then rinse with No. 5132 thinner. One (1) coat alkyd zinc dust primer and two (2) coats alkyd enamel paint.
- 4.** Cementitious Siding: One (1) coat primer and two (2) coats flat exterior acrylic latex house paint, in a color as selected by the Owner.

END OF SECTION