

TECHNICAL SPECIFICATIONS
VOLUME 2 OF 3
100% CONSTRUCTION DOCUMENTS
May 9, 2025



Griffin Middle School
PHASE 2 – Gymnasium
Leon County Schools

Architect



Architects Lewis + Whitlock
206 W. VIRGINIA STREET
TALLAHASSEE FL 32301
850 942 1718 | think3d.net
FLAA0003316

Consultant Team

McGinnis & Fleming, Inc.
Bliss & Nyitray, Inc.
Kimley-Horn, Inc

TABLE OF CONTENTS
VOLUME 2 OF 3

TECHNICAL SPECIFICATIONS

DIVISION 01 - GENERAL REQUIREMENTS

| | |
|--------|--|
| 011000 | SUMMARY |
| 012300 | ALTERNATES |
| 012500 | SUBSTITUTION PROCEDURES |
| 013000 | ADMINISTRATIVE REQUIREMENTS |
| 014000 | QUALITY REQUIREMENTS |
| 015713 | TEMPORARY EROSION AND SEDIMENT CONTROL |
| 016000 | PRODUCT REQUIREMENTS |
| 017000 | EXECUTION AND CLOSEOUT REQUIREMENTS |
| 017419 | CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL |
| 019113 | GENERAL COMMISSIONING REQUIREMENTS |

DIVISION 02 – EXISTING CONDITIONS

| | |
|--------|------------|
| 024100 | DEMOLITION |
|--------|------------|

DIVISION 03 - CONCRETE

| | |
|--------|----------------------------------|
| 031000 | CONCRETE FORMING AND ACCESSORIES |
| 032000 | CONCRETE REINFORCING |
| 033000 | CAST-IN-PLACE CONCRETE |
| 033543 | POLISHED CONCRETE FINISHING |

DIVISION 04 - MASONRY

| | |
|--------|--------------------------|
| 042723 | CAVITY WALL UNIT MASONRY |
| 042900 | REINFORCED UNIT MASONRY |

DIVISION 05 - METALS

| | |
|--------|---------------------------|
| 051200 | STRUCTURAL STEEL |
| 052100 | STEEL JOIST FRAMING |
| 053100 | STEEL DECK |
| 054000 | COLD-FORMED METAL FRAMING |
| 055100 | METAL STAIRS |
| 055133 | METAL LADDERS |
| 055213 | PIPE AND TUBE RAILINGS |

DIVISION 06 - WOOD, PLASTICS, AND COMPOSITES

| | |
|--------|-----------------------------|
| 061000 | ROUGH CARPENTRY |
| 064100 | ARCHITECTURAL WOOD CASEWORK |

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

| | |
|--------|--|
| 070553 | FIRE AND SMOKE ASSEMBLY IDENTIFICATION |
| 072100 | THERMAL INSULATION |
| 072500 | WEATHER BARRIERS |
| 074113 | METAL ROOF PANELS - PETERSEN ALUMINUM |
| 074213 | METAL WALL PANELS |
| 075419 | POLYVINYL-CHLORIDE ROOFING - VERSICO |
| 077100 | ROOF SPECIALTIES |
| 077123 | MANUFACTURED GUTTERS AND DOWNSPOUTS |
| 077200 | ROOF ACCESSORIES |
| 078400 | FIRESTOPPING |
| 079200 | JOINT SEALANTS |

DIVISION 08 - OPENINGS

| | |
|-----------|-------------------------------|
| 081113 | HOLLOW METAL DOORS AND FRAMES |
| 083100 | ACCESS DOORS AND PANELS |
| 083326 | OVERHEAD COILING GRILLES |
| 084313 | ALUMINUM-FRAMED STOREFRONTS |
| 087100.11 | DOOR HARDWARE |
| 088000 | GLAZING |
| 088300 | MIRRORS |

DIVISION 09 - FINISHES

| | |
|--------|--|
| 092116 | GYPSUM BOARD ASSEMBLIES |
| 092216 | NON-STRUCTURAL METAL FRAMING |
| 093000 | TILING |
| 095100 | ACOUSTICAL CEILINGS |
| 096466 | WOOD ATHLETIC FLOORING |
| 096500 | RESILIENT FLOORING |
| 096700 | FLUID-APPLIED FLOORING |
| 096813 | TILE CARPETING |
| 098414 | ACOUSTIC STRETCHED-FABRIC WALL AND CEILING SYSTEMS |
| 099113 | EXTERIOR PAINTING |
| 099123 | INTERIOR PAINTING |
| 099600 | HIGH-PERFORMANCE COATINGS |

**SECTION 011000
SUMMARY**

PART 1 GENERAL

1.01 PROJECT

- A. Project Name: Griffin Middle School -New Gymnasium
- B. Owner's Name: Leon County Schools.
- C. Architect's Name: Architects Lewis + Whitlock, PA.
- D. The project scope includes demolition of an existing cafetorium and band practice buildings, and the construction of a new one-story middle school gymnasium on the campus of Griffin Middle School in Tallahassee, Florida. The project includes site demolition, site work, utility connections, and construction of a new gymnasium building.

1.02 CONTRACT DESCRIPTION

- A. Contract Type: A single prime contract based on the Cost of the Work plus a fee as described in Document 005000 - Contracting Forms and Supplements.

1.03 OWNER OCCUPANCY

- A. Owner intends to occupy the Project upon Substantial Completion.
- B. Owner intends to occupy adjacent buildings during and prior to the completion date for the conduct of normal operations.
- C. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- D. Schedule the Work to accommodate Owner occupancy.

1.04 CONTRACTOR USE OF SITE AND PREMISES

- A. Construction Operations: Limited to areas noted on Drawings.
 - 1. Locate and conduct construction activities in ways that will limit disturbance to site.
- B. Provide access to and from site as required by law and by Owner:
 - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
 - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- C. Utility Outages and Shutdown:
 - 1. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
 - 2. Prevent accidental disruption of utility services to other facilities.

1.05 WORK SEQUENCE

- A. Coordinate construction schedule and operations with Owner.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 011000

This page intentionally left blank

**SECTION 012300
ALTERNATES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Description of Alternates.

1.02 ACCEPTANCE OF ALTERNATES

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

1.03 SCHEDULE OF ALTERNATES

- A. Additive Alternates
 - 1. Alternate No. 1
 - a. Install custom hand-painted murals in Lobby (where shown).
 - 2. Alternate No. 2
 - a. Fabricate and install "GYMNASIUM" signage (where shown).
 - 3. Alternate No. 3
 - a. Fabricate and install "GYMNASIUM" signage (where shown).

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION - NOT USED

END OF SECTION 012300

This page intentionally left blank

**SECTION 012500
SUBSTITUTION PROCEDURES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Procedural requirements for proposed substitutions.

1.02 RELATED REQUIREMENTS

- A. Section 002113 - Instructions to Bidders: Restrictions on timing of substitution requests.
- B. Section 004325 - Substitution Request Form - During Procurement: Required form for substitution requests made prior to award of contract (During procurement).
- C. Section 006325 - Substitution Request Form - During Construction: Required form for substitution requests made after award of contract (During construction).
- D. Section 012300 - Alternates, for product alternatives affecting this section.
- E. Section 013000 - Administrative Requirements: Submittal procedures, coordination.
- F. Section 016000 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

1.03 DEFINITIONS

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.
 - 1. Substitutions for Cause: Proposed due to changed Project circumstances beyond Contractor's control.
 - 2. Substitutions for Convenience: Proposed due to possibility of offering substantial advantage to the Project.
 - a. Substitution requests offering advantages solely to the Contractor will not be considered.
- B. Substitutions: See General Conditions for definition.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 GENERAL REQUIREMENTS

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
 - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
 - 2. Agrees to provide the same warranty for the substitution as for the specified product.
 - 3. Agrees to provide same or equivalent maintenance service and source of replacement parts, as applicable.
 - 4. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
 - 5. Waives claims for additional costs or time extension that may subsequently become apparent.
 - 6. Agrees to reimburse Owner and Architect for review or redesign services associated with re-approval by authorities.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
 - 1. Note explicitly any non-compliant characteristics.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
 - 1. Forms included in the Project Manual are adequate for this purpose, and must be used.

- D. Limit each request to a single proposed substitution item.
 - 1. Submit an electronic document, combining the request form with supporting data into single document.

3.02 SUBSTITUTION PROCEDURES DURING PROCUREMENT

- A. Submittal Time Restrictions:
 - 1. Section 002113 - Instructions to Bidders specifies time restrictions and the documents required for submitting substitution requests during the bidding period.
 - 2. Owner will consider requests for substitutions only if submitted at least 10 days prior to the date for receipt of bids.
- B. Submittal Form (before award of contract):
 - 1. Submit substitution requests by completing the form in Section 004325; see this section for additional information and instructions. Use only this form; other forms of submission are unacceptable.

3.03 SUBSTITUTION PROCEDURES DURING CONSTRUCTION

- A. Submittal Form (after award of contract):
 - 1. Submit substitution requests by completing the form in Section 004325. Use only this form; other forms of submission are unacceptable.
- B. Submit request for Substitution for Cause immediately upon discovery of need for substitution, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
- C. Submit request for Substitution for Convenience immediately upon discovery of its potential advantage to the project, but not later than 14 days prior to time required for review and approval by Architect, in order to stay on approved project schedule.
 - 1. In addition to meeting general documentation requirements, document how the requested substitution benefits the Owner through cost savings, time savings, greater energy conservation, or in other specific ways.
 - 2. Document means of coordinating of substitution item with other portions of the work, including work by affected subcontractors.
 - 3. Bear the costs engendered by proposed substitution of:
 - a. Owner's compensation to the Architect for any required redesign, time spent processing and evaluating the request.
 - b. Other construction by Owner.
 - c. Other unanticipated project considerations.
- D. Substitutions will not be considered under one or more of the following circumstances:
 - 1. When they are indicated or implied on shop drawing or product data submittals, without having received prior approval.
 - 2. Without a separate written request.
 - 3. When acceptance will require revisions to Contract Documents.

3.04 RESOLUTION

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request.
 - 1. Architect's decision following review of proposed substitution will be noted on the submitted form.

3.05 ACCEPTANCE

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.

3.06 CLOSEOUT ACTIVITIES

- A. See Section 017800 - Closeout Submittals, for closeout submittals.
- B. Include completed Substitution Request Forms as part of the Project record.

END OF SECTION 012500

This page intentionally left blank

**SECTION 013000
ADMINISTRATIVE REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Electronic document submittal service.
- B. Preconstruction meeting.
- C. Progress meetings.
- D. Coordination drawings.
- E. Submittals for review, information, and project closeout.
- F. Number of copies of submittals.
- G. Submittal procedures.

PART 2 PRODUCTS - NOT USED

PART 3 EXECUTION

3.01 ELECTRONIC DOCUMENT SUBMITTAL SERVICE

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format.
 - 1. This procedure applies to requests for information (RFIs), shop drawings, information submittals, field reports, meeting minutes, and any other document any participant wishes to make part of the project record.
 - 2. It is Contractor's responsibility to submit documents in allowable format.
 - 3. Paper document transmittals will not be reviewed.
 - 4. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.

3.02 PRECONSTRUCTION MEETING

- A. Schedule meeting after Notice of Award.
- B. Attendance Required:
 - 1. Owner.
 - 2. Architect.
 - 3. Contractor.
- C. Agenda:
 - 1. Submission of list of subcontractors, list of products, schedule of values, and progress schedule.
 - 2. Designation of personnel representing the parties to Contract, _____ and .
 - 3. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.03 PROGRESS MEETINGS

- A. Schedule and administer meetings throughout progress of the Work at maximum Bi-weekly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
 - 1. Contractor.
 - 2. Owner.
 - 3. Architect.
 - 4. Contractor's superintendent.

- D. Agenda:
1. Review minutes of previous meetings.
 2. Review of work progress.
 3. Field observations, problems, and decisions.
 4. Identification of problems that impede, or will impede, planned progress.
 5. Review of submittals schedule and status of submittals.
 6. Maintenance of progress schedule.
 7. Corrective measures to regain projected schedules.
 8. Planned progress during succeeding work period.
 9. Maintenance of quality and work standards.
 10. Effect of proposed changes on progress schedule and coordination.
 11. Other business relating to work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 SUBMITTALS FOR REVIEW

- A. When the following are specified in individual sections, submit them for review:
1. Product data.
 2. Shop drawings.
 3. Samples for selection.
 4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in the contract documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 017800 - Closeout Submittals.

3.05 SUBMITTALS FOR INFORMATION

- A. When the following are specified in individual sections, submit them for information:
1. Design data.
 2. Certificates.
 3. Test reports.
 4. Inspection reports.
 5. Manufacturer's instructions.
 6. Manufacturer's field reports.
 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

3.06 SUBMITTALS FOR PROJECT CLOSEOUT

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 017800 - Closeout Submittals:
1. Project record documents.
 2. Operation and maintenance data.
 3. Warranties.
 4. Bonds.
 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

3.07 NUMBER OF COPIES OF SUBMITTALS

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
 - 1. After review, produce duplicates.
 - 2. Retained samples will not be returned to Contractor unless specifically so stated.

3.08 SUBMITTAL PROCEDURES

- A. General Requirements:

END OF SECTION 013000

This page intentionally left blank

**SECTION 014000
QUALITY REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Testing and inspection agencies and services.
- B. Control of installation.
- C. Mock-ups.
- D. Tolerances.
- E. Manufacturers' field services.
- F. Defect Assessment.

1.02 REFERENCE STANDARDS

- A. ASTM C1021 - Standard Practice for Laboratories Engaged in Testing of Building Sealants; 2008 (Reapproved 2023).
- B. ASTM C1077 - Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation; 2024.
- C. ASTM C1093 - Standard Practice for Accreditation of Testing Agencies for Masonry; 2023.
- D. ASTM D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction; 2023.
- E. ASTM E329 - Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection; 2023.
- F. ASTM E543 - Standard Specification for Agencies Performing Nondestructive Testing; 2021.

1.03 TESTING AND INSPECTION AGENCIES AND SERVICES

- A. Contractor shall employ and pay for services of an independent testing agency to perform other specified testing.
- B. Employment of agency in no way relieves Contractor of obligation to perform Work in accordance with requirements of Contract Documents.
- C. Contractor Employed Agency:
 - 1. Testing agency: Comply with requirements of ASTM E329, ASTM E543, ASTM C1021, ASTM C1077, ASTM C1093, and ASTM D3740.
 - 2. Laboratory: Authorized to operate in Florida.

PART 3 EXECUTION

2.01 CONTROL OF INSTALLATION

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.
- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

2.02 MOCK-UPS

- A. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Accepted mock-ups shall be a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

2.03 TOLERANCES

- A. Monitor fabrication and installation tolerance control of products to produce acceptable Work. Do not permit tolerances to accumulate.
- B. Comply with manufacturers' tolerances. Should manufacturers' tolerances conflict with Contract Documents, request clarification from Architect before proceeding.
- C. Adjust products to appropriate dimensions; position before securing products in place.

2.04 TESTING AND INSPECTION

- A. Testing Agency Duties:
 - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
 - 2. Perform specified sampling and testing of products in accordance with specified standards.
 - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
 - 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
 - 5. Perform additional tests and inspections required by Architect.
 - 6. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
 - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
 - 2. Agency may not approve or accept any portion of the Work.
 - 3. Agency may not assume any duties of Contractor.
 - 4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
 - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
 - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
 - 3. Provide incidental labor and facilities:
 - a. To provide access to Work to be tested/inspected.
 - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
 - c. To facilitate tests/inspections.
 - d. To provide storage and curing of test samples.
 - 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
 - 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
 - 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

- D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

2.05 MANUFACTURERS' FIELD SERVICES

- A. When specified in individual specification sections, require material or product suppliers or manufacturers to provide qualified staff personnel to observe site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, test, adjust, and balance equipment, and _____ as applicable, and to initiate instructions when necessary.
- B. Report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

2.06 DEFECT ASSESSMENT

- A. Replace Work or portions of the Work not complying with specified requirements.

END OF SECTION 014000

This page intentionally left blank

**SECTION 015713
TEMPORARY EROSION AND SEDIMENT CONTROL**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prevention of erosion due to construction activities.
- B. Prevention of sedimentation of waterways, open drainage ways, and storm and sanitary sewers due to construction activities.
- C. Restoration of areas eroded due to insufficient preventive measures.
- D. Performance bond.
- E. Compensation of Owner for fines levied by authorities having jurisdiction due to non-compliance by Contractor.

1.02 RELATED REQUIREMENTS

- A. Section 321123 - Aggregate Base Courses: Temporary and permanent roadways.

1.03 REFERENCE STANDARDS

- A. ASTM D4355/D4355M - Standard Test Method for Deterioration of Geotextiles by Exposure to Light, Moisture and Heat in a Xenon Arc Type Apparatus; 2014.
- B. ASTM D4533/D4533M - Standard Test Method for Trapezoid Tearing Strength of Geotextiles; 2015 (Reapproved 2023).
- C. ASTM D4632/D4632M - Standard Test Method for Grab Breaking Load and Elongation of Geotextiles; 2015a.
- D. ASTM D4751 - Standard Test Method for Determining Apparent Opening Size of a Geotextile; 2012.
- E. ASTM D4873/D4873M - Standard Guide for Identification, Storage, and Handling of Geosynthetic Rolls and Samples; 2017 (Reapproved 2021).
- F. EPA (NPDES) - National Pollutant Discharge Elimination System (NPDES), Construction General Permit; Current Edition.

1.04 PERFORMANCE REQUIREMENTS

- A. Comply with requirements of EPA (NPDES) for erosion and sedimentation control, as specified by the NPDES, for Phases I and II, and in compliance with requirements of Construction General Permit (CGP), whether the project is required by law to comply or not.
- B. Also comply with all more stringent requirements of State of Florida Erosion and Sedimentation Control Manual.
- C. Develop and follow an Erosion and Sedimentation Prevention Plan and submit periodic inspection reports.
- D. Do not begin clearing, grading, or other work involving disturbance of ground surface cover until applicable permits have been obtained; furnish all documentation required to obtain applicable permits.
- E. Provide to Owner a Performance Bond covering erosion and sedimentation preventive measures only, in an amount equal to 100 percent of the cost of erosion and sedimentation control work.
- F. Timing: Put preventive measures in place as soon as possible after disturbance of surface cover and before precipitation occurs.
- G. Storm Water Runoff: Control increased storm water runoff due to disturbance of surface cover due to construction activities for this project.

1. Prevent runoff into storm and sanitary sewer systems, including open drainage channels, in excess of actual capacity or amount allowed by authorities having jurisdiction, whichever is less.
 2. Anticipate runoff volume due to the most extreme short term and 24-hour rainfall events that might occur in 25 years.
- H. Erosion On Site: Minimize wind, water, and vehicular erosion of soil on project site due to construction activities for this project.
1. Control movement of sediment and soil from temporary stockpiles of soil.
 2. Prevent development of ruts due to equipment and vehicular traffic.
 3. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- I. Erosion Off Site: Prevent erosion of soil and deposition of sediment on other properties caused by water leaving the project site due to construction activities for this project.
1. Prevent windblown soil from leaving the project site.
 2. Prevent tracking of mud onto public roads outside site.
 3. Prevent mud and sediment from flowing onto sidewalks and pavements.
 4. If erosion occurs due to non-compliance with these requirements, restore eroded areas at no cost to Owner.
- J. Sedimentation of Waterways On Site: Prevent sedimentation of waterways on the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
 2. If sediment basins are used as temporary preventive measures, pump dry and remove deposited sediment after each storm.
- K. Sedimentation of Waterways Off Site: Prevent sedimentation of waterways off the project site, including rivers, streams, lakes, ponds, open drainage ways, storm sewers, and sanitary sewers.
1. If sedimentation occurs, install or correct preventive measures immediately at no cost to Owner; remove deposited sediments; comply with requirements of authorities having jurisdiction.
- L. Open Water: Prevent standing water that could become stagnant.
- M. Maintenance: Maintain temporary preventive measures until permanent measures have been established.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Erosion and Sedimentation Control Plan:
1. Include:
 - a. Site plan identifying soils and vegetation, existing erosion problems, and areas vulnerable to erosion due to topography, soils, vegetation, or drainage.
 - b. Site plan showing grading; new improvements; temporary roads, traffic accesses, and other temporary construction; and proposed preventive measures.
 - c. Where extensive areas of soil will be disturbed, include storm water flow and volume calculations, soil loss predictions, and proposed preventive measures.
 - d. Schedule of temporary preventive measures, in relation to ground disturbing activities.
 - e. Other information required by law.
 - f. Format required by law is acceptable, provided any additional information specified is also included.

2. Obtain the approval of the Plan by authorities having jurisdiction.
3. Obtain the approval of the Plan by Owner.
- C. Certificate: Mill certificate for silt fence fabric attesting that fabric and factory seams comply with specified requirements, signed by legally authorized official of manufacturer; indicate actual minimum average roll values; identify fabric by roll identification numbers.
- D. Inspection Reports: Submit report of each inspection; identify each preventive measure, indicate condition, and specify maintenance or repair required and accomplished.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Mulch: Use one of the following:
 1. Straw or hay.
 2. Erosion control matting or netting.
 3. Polyethylene film, where specifically indicated only.
- B. Grass Seed For Temporary Cover: Select a species appropriate to climate, planting season, and intended purpose. If same area will later be planted with permanent vegetation, do not use species known to be excessively competitive or prone to volunteer in subsequent seasons.
- C. Bales: Air dry, rectangular straw bales.
 1. Cross Section: 14 by 18 inches, minimum.
 2. Bindings: Wire or string, around long dimension.
- D. Bale Stakes: One of the following, minimum 3 feet long:
 1. Steel U- or T-section, with minimum mass of 1.33 pound per linear foot.
 2. Wood, 2 by 2 inches in cross section.
- E. Silt Fence Fabric: Polypropylene geotextile resistant to common soil chemicals, mildew, and insects; non-biodegradable; in longest lengths possible; fabric including seams with the following minimum average roll lengths:
 1. Average Opening Size: 30 U.S. Std. Sieve, maximum, when tested in accordance with ASTM D4751.
 2. Ultraviolet Resistance: Retaining at least 70 percent of tensile strength, when tested in accordance with ASTM D4355/D4355M after 500 hours exposure.
 3. Tensile Strength: 100 pounds-force, minimum, in cross-machine direction; 124 pounds-force, minimum, in machine direction; when tested in accordance with ASTM D4632/D4632M.
 4. Elongation: 15 to 30 percent, when tested in accordance with ASTM D4632/D4632M.
 5. Tear Strength: 55 pounds-force, minimum, when tested in accordance with ASTM D4533/D4533M.
 6. Color: Manufacturer's standard, with embedment and fastener lines preprinted.
- F. Silt Fence Posts: One of the following, minimum 5 feet long:
- G. Gravel: See Section 321123 for aggregate.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine site and identify existing features that contribute to erosion resistance; maintain such existing features to greatest extent possible.

3.02 PREPARATION

- A. Schedule work so that soil surfaces are left exposed for the minimum amount of time.

3.03 SCOPE OF PREVENTIVE MEASURES

- A. In all cases, if permanent erosion resistant measures have been installed temporary preventive measures are not required.

- B. Construction Entrances: Traffic-bearing aggregate surface.
 - 1. Width: As required; 20 feet, minimum.
 - 2. Length: 50 feet, minimum.
 - 3. Provide at each construction entrance from public right-of-way.
 - 4. Where necessary to prevent tracking of mud onto right-of-way, provide wheel washing area out of direct traffic lane, with drain into sediment trap or basin.
- C. Linear Sediment Barriers: Made of silt fences.
 - 1. Provide linear sediment barriers:
 - a. Along downhill perimeter edge of disturbed areas, including soil stockpiles.
 - 2. Space sediment barriers with the following maximum slope length upslope from barrier:
 - a. Slope of Less Than 2 Percent: 100 feet..
 - b. Slope Between 2 and 5 Percent: 75 feet.
 - c. Slope Between 5 and 10 Percent: 50 feet.
 - d. Slope Between 10 and 20 Percent: 25 feet.
 - e. Slope Over 20 Percent: 15 feet.
- D. Storm Drain Curb Inlet Sediment Trap: Protect each curb inlet using one of the following measures:
 - 1. Filter fabric wrapped around hollow concrete blocks blocking entire inlet face area; use one piece of fabric wrapped at least 1-1/2 times around concrete blocks and secured to prevent dislodging; orient cores of blocks so runoff passes into inlet.
 - 2. Straw bale row blocking entire inlet face area; anchor into pavement.
- E. Storm Drain Drop Inlet Sediment Traps: As detailed on drawings.
- F. Temporary Splash Pads: Stone aggregate over filter fabric; size to suit application; provide at downspout outlets and storm water outlets.
- G. Soil Stockpiles: Protect using one of the following measures:
 - 1. Cover with polyethylene film, secured by placing soil on outer edges.
 - 2. Cover with mulch at least 4 inches thickness of pine needles, sawdust, bark, wood chips, or shredded leaves, or 6 inches of straw or hay.
- H. Mulching: Use only for areas that may be subjected to erosion for less than 6 months.
- I. Temporary Seeding: Use where temporary vegetated cover is required.

3.04 INSTALLATION

- A. Traffic-Bearing Aggregate Surface:
 - 1. Excavate minimum of 6 inches.
 - 2. Place geotextile fabric full width and length, with minimum 12 inch overlap at joints.
 - 3. Place and compact at least 6 inches of 1 1/2 to 3 1/2 inch diameter stone.
- B. Silt Fences:
 - 1. Store and handle fabric in accordance with ASTM D4873/D4873M.
 - 2. Where slope gradient is less than 3:1 or barriers will be in place less than 6 months, use nominal 16 inch high barriers with minimum 36 inch long posts spaced at 6 feet maximum, with fabric embedded at least 4 inches in ground.
 - 3. Where slope gradient is steeper than 3:1 or barriers will be in place over 6 months, use nominal 28 inch high barriers, minimum 48 inch long posts spaced at 6 feet maximum, with fabric embedded at least 6 inches in ground.
 - 4. Where slope gradient is steeper than 3:1 and vertical height of slope between barriers is more than 20 feet, use nominal 32 inch high barriers with woven wire reinforcement and steel posts spaced at 4 feet maximum, with fabric embedded at least 6 inches in ground.
 - 5. Install with top of fabric at nominal height and embedment as specified.
 - 6. Do not splice fabric width; minimize splices in fabric length; splice at post only, overlapping at least 18 inches, with extra post.

7. Wherever runoff will flow around end of barrier or over the top, provide temporary splash pad or other outlet protection; at such outlets in the run of the barrier, make barrier not more than 12 inches high with post spacing not more than 4 feet.
- C. Straw Bale Rows:
1. Install bales in continuous rows with ends butting tightly, with one bale at each end of row turned uphill.
 2. Install bales so that bindings are not in contact with the ground.
 3. Embed bales at least 4 inches in the ground.
 4. Anchor bales with at least two stakes per bale, driven at least 18 inches into the ground; drive first stake in each bale toward the previously placed bale to force bales together.
 5. Fill gaps between ends of bales with loose straw wedged tightly.
 6. Place soil excavated for trench against bales on the upslope side of the row, compacted.
- D. Temporary Seeding:
1. When hydraulic seeder is used, seedbed preparation is not required.
 2. When surface soil has been sealed by rainfall or consists of smooth undisturbed cut slopes, and conventional or manual seeding is to be used, prepare seedbed by scarifying sufficiently to allow seed to lodge and germinate.
 3. If temporary mulching was used on planting area but not removed, apply nitrogen fertilizer at 1 pound per 1000 sq ft.
 4. On soils of very low fertility, apply 10-10-10 fertilizer at rate of 12 to 16 pounds per 1000 sq ft.
 5. Incorporate fertilizer into soil before seeding.
 6. Apply seed uniformly; if using drill or cultipacker seeders place seed 1/2 to 1 inch deep.
 7. Irrigate as required to thoroughly wet soil to depth that will ensure germination, without causing runoff or erosion.
 8. Repeat irrigation as required until grass is established.

3.05 MAINTENANCE

- A. Inspect preventive measures weekly, within 24 hours after the end of any storm that produces 0.5 inches or more rainfall at the project site, and daily during prolonged rainfall.
- B. Repair deficiencies immediately.
- C. Silt Fences:
1. Promptly replace fabric that deteriorates unless need for fence has passed.
 2. Remove silt deposits that exceed one-third of the height of the fence.
 3. Repair fences that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- D. Straw Bale Rows:
1. Promptly replace bales that fall apart or otherwise deteriorate unless need has passed.
 2. Remove silt deposits that exceed one-half of the height of the bales.
 3. Repair bale rows that are undercut by runoff or otherwise damaged, whether by runoff or other causes.
- E. Clean out temporary sediment control structures weekly and relocate soil on site.
- F. Place sediment in appropriate locations on site; do not remove from site.

3.06 CLEAN UP

- A. Remove temporary measures after permanent measures have been installed, unless permitted to remain by Architect.
- B. Clean out temporary sediment control structures that are to remain as permanent measures.
- C. Where removal of temporary measures would leave exposed soil, shape surface to an acceptable grade and finish to match adjacent ground surfaces.

END OF SECTION 015713

**SECTION 016000
PRODUCT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. General product requirements.
- B. Sustainable design-related product requirements.
- C. Re-use of existing products.
- D. Transportation, handling, storage and protection.
- E. Product option requirements.
- F. Substitution limitations.
- G. Maintenance materials, including extra materials, spare parts, tools, and software.

1.02 RELATED REQUIREMENTS

- A. Section 012500 - Substitution Procedures: Substitutions made during procurement and/or construction phases.
- B. Section 013329.02 - Sustainable Design Reporting - LEED v4: Reporting requirements.
- C. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions: Requirements for VOC-restricted product categories.
- D. Section 017419 - Construction Waste Management and Disposal: Waste disposal requirements potentially affecting product selection, packaging and substitutions.

1.03 REFERENCE STANDARDS

- A. C2C (DIR) - C2C Certified Products Registry; Cradle to Cradle Products Innovation Institute; Current Edition.
- B. EN 15804 - Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products; 2012.
- C. GreenScreen (LIST) - GreenScreen for Safer Chemicals List Translator; Clean Production Action; www.greenscreenchemicals.org.
- D. GreenScreen (METH) - GreenScreen for Safer Chemicals Method v1.2; Clean Production Action; Current Edition.
- E. ISO 14025 - Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures; 2006.
- F. ISO 14040 - Environmental management -- Life cycle assessment -- Principles and framework; 2006.
- G. ISO 14044 - Environmental management -- Life cycle assessment -- Requirements and guidelines; 2006.
- H. ISO 21930 - Sustainability in building construction -- Environmental declaration of building products; 2007.

1.04 SUBMITTALS

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.

1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.
- D. Sustainable Design Submittals: Items necessary to document use of sustainable construction materials, products, and practices.
 1. See Section 013329.02 for Contractor's reporting necessary for achievement of targeted LEED v4 certification level.

1.05 QUALITY ASSURANCE

- A. Chain-of-Custody (COC): A procedure that tracks a product from the point of harvest or extraction to its end use, including successive stages of processing, transformation, manufacturing, and distribution.
- B. Chain-of-Custody Certificates: Certificates signed by manufacturers and fabricators certifying that wood used to make products was obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001.
- C. Composite Wood and Agrifiber: Products made of wood particles and/or plant material pressed and bonded with adhesive or resin such as particleboard, medium density fiberboard (MDF), plywood, wheatboard, strawboard, panel substrates, and door cores.
- D. Corporate Sustainability Report: A third-party verified report that outlines the environmental impacts of extraction operations and activities associated with the manufacturer's product and the product's supply chain.
- E. Cradle-to-Cradle Certified: End use product certified Cradle-to-Cradle v2 Basic or Cradle-to-Cradle v3 Bronze, minimum, as evidenced by C2C (DIR).
- F. Environmental Product Declaration (EPD): Publicly available, critically reviewed life cycle analysis having at least a cradle-to-gate scope.
 1. Good: Product-specific; compliant with ISO 14044.
 2. Better: Industry-wide, generic; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
 3. Best: Commercial-product-specific; compliant with ISO 21930, or with ISO 14044, ISO 14040, ISO 14025, and EN 15804; Type III third-party certification with external verification, in which the manufacturer is recognized as the program operator.
 4. Where demonstration of impact reduction below industry average is required, submit both industry-wide and commercial-product-specific declarations; or submit at least 5 declarations for products of the same type by other manufacturers in the same industry.
- G. GreenScreen Chemical Hazard Analysis: Ingredients of 100 parts-per-million or greater evaluated using GreenScreen (METH).
 1. Good: GreenScreen (LIST) evaluation to identify Benchmark 1 hazards; a Health Product Declaration includes this information.
 2. Better: GreenScreen Full Assessment.
 3. Best: GreenScreen Full Assessment by GreenScreen Licensed Profiler.
 4. Acceptable Evidence: GreenScreen report.
- H. Health Product Declarations (HPD): Complete, published declaration with full disclosure of known hazards, prepared using one of the HPDC (HPD-OLT) online tools.
- I. Leadership Extraction Practices: Products that meet at least one of the responsible extraction criteria, which include: extended producer responsibility; bio-based materials; FSC wood products; materials reuse; recycled content; and other programs approved by sustainability certification system used for the project.
- J. Manufacturer's Inventory of Product Content: Publicly available inventory of every ingredient identified by name and Chemical Abstract Service Registration Number (CAS RN).
 1. For ingredients considered a trade secret or intellectual property, the name and CAS RN may be omitted, provided the ingredient's role, amount, and GreenScreen Benchmark are

given.

- K. Rapidly Renewable Materials: Made from agricultural products that are typically harvested within a 10-year or shorter cycle.
- L. Regional Materials: Materials that are extracted, harvested, recovered, and manufactured within a radius of 100 miles from the Project site.
- M. Reused Products: Materials and equipment previously used in this or other construction, salvaged and refurbished as specified.
 - 1. Wood fabricated from timber abandoned in transit after harvesting is considered reused, not recycled.
 - 2. Acceptable Evidence: Information about the origin or source, from Contractor or supplier.
- N. Source Location: Location of harvest, extraction, recovery, or manufacture; where information about source location is required to be submitted, give the postal address:
 - 1. In every case, indicate the location of final assembly.
 - 2. For harvested products, indicate location of harvest.
 - 3. For extracted (i.e. mined) products, indicate location of extraction.
 - 4. For recovered products, indicate location of recovery.
 - 5. For products involving multiple manufacturing steps, provide a description of the process at each step, with location.
 - 6. Acceptable Evidence:
 - a. Manufacturer's certification.
 - b. Life cycle analysis (LCA) performed by third-party.
- O. Sustainably Harvested Wood: Solid wood, wood chips, and wood fiber certified or labeled by an organization accredited by one of the following:
 - 1. The Forest Stewardship Council, The Principles for Natural Forest Management; for Canada visit <http://www.fsccanada.org>, for the USA visit <http://www.fscus.org>.
 - 2. Acceptable Evidence: Copies of invoices bearing the certifying organization's certification numbers.

PART 2 PRODUCTS

2.01 EXISTING PRODUCTS

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by the Contract Documents.
- B. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

2.02 NEW PRODUCTS

- A. Provide new products unless specifically required or permitted by the Contract Documents.
- B. All new exterior envelope products must be Florida Product Approved. Provide Notice of Acceptance documentation with submittals.
- C. Use of products having any of the following characteristics is not permitted:
 - 1. Made using or containing CFC's or HCFC's.
 - 2. Made of wood from newly cut old growth timber.
 - 3. Containing lead, cadmium, or asbestos.
- D. Where other criteria are met, Contractor shall give preference to products that:
 - 1. If used on interior, have lower emissions, as defined in Section 016116.
 - 2. If wet-applied, have lower VOC content, as defined in Section 016116.
 - 3. Are extracted, harvested, and/or manufactured closer to the location of the project.
 - 4. Have longer documented life span under normal use.
 - 5. Result in less construction waste. See Section 017419
 - 6. Are made of recycled materials.

7. If made of wood, are made of sustainably harvested wood, wood chips, or wood fiber.
8. If bio-based, other than wood, are or are made of Sustainable Agriculture Network certified products.
9. Are Cradle-to-Cradle Certified.
10. Have a published Environmental Product Declaration (EPD).
11. Have a published Health Product Declaration (HPD).

2.03 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

2.04 MAINTENANCE MATERIALS

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

PART 3 EXECUTION

3.01 SUBSTITUTION LIMITATIONS

- A. See Section 012500 - Substitution Procedures.

3.02 TRANSPORTATION AND HANDLING

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

3.03 STORAGE AND PROTECTION

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 017419.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Provide off-site storage and protection when site does not permit on-site storage or protection.

- G. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- H. Comply with manufacturer's warranty conditions, if any.
- I. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- J. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- K. Prevent contact with material that may cause corrosion, discoloration, or staining.
- L. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.
- M. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

END OF SECTION 016000

This page intentionally left blank

**SECTION 017000
EXECUTION AND CLOSEOUT REQUIREMENTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Cleaning and protection.
- F. Demonstration and instruction of Owner personnel.
- G. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.
- H. General requirements for maintenance service.

1.02 RELATED REQUIREMENTS

- A. Section 078400 - Firestopping.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Cutting and Patching: Submit written request in advance of cutting or alteration that affects:
 - 1. Structural integrity of any element of Project.
 - 2. Integrity of weather exposed or moisture resistant element.
 - 3. Efficiency, maintenance, or safety of any operational element.
 - 4. Visual qualities of sight exposed elements.
 - 5. Work of Owner or separate Contractor.
- C. Project Record Documents: Accurately record actual locations of capped and active utilities.

1.04 QUALIFICATIONS

- A. For surveying work, employ a land surveyor registered in Florida and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

1.05 PROJECT CONDITIONS

- A. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- B. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
 - 1. Provide dust-proof barriers between construction areas and areas continuing to be occupied by Owner.
- C. Noise Control: Provide methods, means, and facilities to minimize noise produced by construction operations.
 - 1. Indoors: Limit conduct of especially noisy interior work to the hours of 6 pm to 7 am.
- D. Pest and Rodent Control: Provide methods, means, and facilities to prevent pests and insects from damaging the work.
- E. Rodent Control: Provide methods, means, and facilities to prevent rodents from accessing or invading premises.

1.06 COORDINATION

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

PART 2 PRODUCTS

2.01 PATCHING MATERIALS

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

3.02 PREPARATION

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

3.03 PREINSTALLATION MEETINGS

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
 - 1. Review conditions of examination, preparation and installation procedures.
 - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.

3.04 LAYING OUT THE WORK

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
 - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations; and _____.
 - 2. Grid or axis for structures.
 - 3. Building foundation, column locations, ground floor elevations, and _____.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

3.05 GENERAL INSTALLATION REQUIREMENTS

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

3.06 ALTERATIONS

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
 - 1. Verify that construction and utility arrangements are as indicated.
 - 2. Report discrepancies to Architect before disturbing existing installation.
 - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.

1. Remove rotted wood, corroded metals, and deteriorated masonry and concrete; replace with new construction specified.
 2. Remove items indicated on drawings.
 3. Relocate items indicated on drawings.
 4. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
 5. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
 2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
 3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
 - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
 - b. Provide temporary connections as required to maintain existing systems in service.
 4. Verify that abandoned services serve only abandoned facilities.
 5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- D. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
 2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
 3. Repair adjacent construction and finishes damaged during removal work.
- E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
1. When existing finished surfaces are cut so that a smooth transition with new work is not possible, terminate existing surface along a straight line at a natural line of division and make recommendation to Architect.
 2. Where removal of partitions or walls results in adjacent spaces becoming one, rework floors, walls, and ceilings to a smooth plane without breaks, steps, or bulkheads.
 3. Where a change of plane of 1/4 inch or more occurs in existing work, submit recommendation for providing a smooth transition for Architect review and request instructions.
 4. Trim existing wood doors as necessary to clear new floor finish. Refinish trim as required.
- F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- G. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.

2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- H. Clean existing systems and equipment.
- I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- J. Do not begin new construction in alterations areas before demolition is complete.
- K. Comply with all other applicable requirements of this section.

3.07 CUTTING AND PATCHING

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
 1. Complete the work.
 2. Fit products together to integrate with other work.
 3. Provide openings for penetration of mechanical, electrical, and other services.
 4. Match work that has been cut to adjacent work.
 5. Repair areas adjacent to cuts to required condition.
 6. Repair new work damaged by subsequent work.
 7. Remove samples of installed work for testing when requested.
 8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 078400, to full thickness of the penetrated element.
- J. Patching:
 1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
 2. Match color, texture, and appearance.
 3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

3.08 PROGRESS CLEANING

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.

- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

3.09 PROTECTION OF INSTALLED WORK

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

3.10 DEMONSTRATION AND INSTRUCTION

- A. Demonstrate start-up, operation, control, adjustment, trouble-shooting, servicing, maintenance, and shutdown of each item of equipment at scheduled time, at equipment location.
- B. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- C. Provide a qualified person who is knowledgeable about the Project to perform demonstration and instruction of Owner's personnel.

3.11 ADJUSTING

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

3.12 FINAL CLEANING

- A. Use cleaning materials that are nonhazardous.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean filters of operating equipment.
- F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, drainage systems, and _____.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

3.13 CLOSEOUT PROCEDURES

- A. Make submittals that are required by governing or other authorities.
 - 1. Provide copies to Architect and Owner.
- B. Accompany Project Coordinator on preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.

- C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.
- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

3.14 MAINTENANCE

- A. Provide service and maintenance of components indicated in specification sections.
- B. Maintenance Period: As indicated in specification sections or, if not indicated, not less than one year from the Date of Substantial Completion or the length of the specified warranty, whichever is longer.
- C. Examine system components at a frequency consistent with reliable operation. Clean, adjust, and lubricate as required.
- D. Include systematic examination, adjustment, and lubrication of components. Repair or replace parts whenever required. Use parts produced by the manufacturer of the original component.
- E. Maintenance service shall not be assigned or transferred to any agent or subcontractor without prior written consent of the Owner.

END OF SECTION 017000

This page intentionally left blank

**SECTION 017419
CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

PART 1 GENERAL

1.01 WASTE MANAGEMENT REQUIREMENTS

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, incineration, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
- E. Methods of trash/waste disposal that are not acceptable are:
 - 1. Burning on the project site.
 - 2. Burying on the project site.
 - 3. Dumping or burying on other property, public or private.
 - 4. Other illegal dumping or burying.
- F. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

1.02 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.

- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Waste Disposal Reports: Submit at specified intervals, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
 - 1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
 - 2. Submit Report on a form acceptable to Owner.
 - 3. Landfill Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
 - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - 4. Incinerator Disposal: Include the following information:
 - a. Identification of material.
 - b. Amount, in tons or cubic yards, of trash/waste material from the project delivered to incinerators.
 - c. State the identity of incinerators, total amount of fees paid to incinerator, and total disposal cost.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - 5. Recycled and Salvaged Materials: Include the following information for each:
 - a. Identification of material, including those retrieved by installer for use on other projects.
 - b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
 - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
 - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
 - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
 - 6. Material Reused on Project: Include the following information for each:
 - a. Identification of material and how it was used in the project.
 - b. Amount, in tons or cubic yards.
 - c. Include weight tickets as evidence of quantity.
 - 7. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.

PART 3 EXECUTION

2.01 WASTE MANAGEMENT PROCEDURES

- A. See Section 013000 for additional requirements for project meetings, reports, submittal procedures, and project documentation.

- B. See Section 015000 for additional requirements related to trash/waste collection and removal facilities and services.
- C. See Section 016000 for waste prevention requirements related to delivery, storage, and handling.
- D. See Section 017000 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

2.02 WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, and Architect.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
 - 1. Prebid meeting.
 - 2. Preconstruction meeting.
 - 3. Regular job-site meetings.
- E. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
 - 1. Provide containers as required.
 - 2. Provide adequate space for pick-up and delivery and convenience to subcontractors.
 - 3. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
- F. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- G. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
- H. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- I. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

END OF SECTION 017419

This page intentionally left blank

SECTION 01 91 13 - GENERAL COMMISSIONING REQUIREMENTS

PART 1 - GENERAL

RELATED DOCUMENTS

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

SUMMARY

Section includes general requirements that apply to the implementation of the commissioning process without regard to specific Divisions, systems, assemblies, or components.

Related Sections:

Section 220800 "Commissioning of Service Water Heating Systems" for commissioning process activities for Service Water Heating Systems, assemblies, equipment, and components.

Section 230800 "Commissioning of HVAC" for commissioning process activities for HVAC&R systems, assemblies, equipment, and components; Testing, Adjusting, and Balancing (TAB) Work; and the Building Automation System (BAS).

260800 "Commissioning of Lighting Control Systems" for commissioning process activities for Lighting Control Systems, assemblies, equipment, and components.

DEFINITIONS

BoD: Basis of Design. A document that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.

Commissioning Plan: A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.

CxA: Commissioning Authority.

OPR: Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.

Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

Issues Log: A document that lists all issues identified during the commissioning process including, but not limited to, issue number, date identified, description of the issue, party who

identified the issue, party assigned to resolve the issue, issue resolution and verification that issue has been resolved and the date the issue was resolved.

Construction Checklists: Documents, prepared by the CxA, that ensure that systems and equipment have been properly installed, started up, calibrated, and tested by the installing Subcontractors or vendors prior to on-site functional performance testing by the CxA. The Construction Checklists may include various Pre-Functional Checklists, Start-up Checklists, Pressure Tests, etc. These documents are completed by the installing subcontractor or vendor, verified by the General Contractor or Construction Manager, and reviewed by the CxA.

Functional Performance Test (FPT): Test of function and operation of equipment and systems. Systems are tested under various modes, such as component failures, unoccupied, life safety conditions, power failure, etc. Systems are run through all specified sequences of operation. System-level test to verify integration, functionality, and/or operation using direct observation or other monitoring methods to assess system performance in comparison with the Basis of Design. The CxA develops FPT procedures and coordinates, witnesses, and documents the testing, which is typically performed and demonstrated by the installing Subcontractor or vendor after construction checklists, start-ups, and pre-verification tests are complete. *NOTE: FPTs are tailored to the actual equipment and products to be installed, so their development is contingent upon completion of the submittal review process.*

Pre-Verification Test (PVT): A test completed by the installing Subcontractors that uses the FPT procedures created by the CxA to verify the function and operation of equipment and systems prior to the formal FPT demonstration witnessed by the CxA. When PVTs demonstrate that systems are installed and function according to the Contract Documents and the OPR, the contractor informs the CxA that a system is ready for functional testing. PVTs shall be prepared by the CxA, completed by the installing Subcontractors or vendors, verified by the General Contractor or Construction Manager, and reviewed by the CxA.

COMMISSIONING TEAM

Members Appointed by Contractor(s):

Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of the Contractor (General Contractor or Construction Manager), including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.

Members Appointed by Owner:

CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner has engaged the CxA under a separate contract with the Engineer.

Representatives of the facility user and operation and maintenance personnel.

Architect and engineering design professionals.

OWNER'S RESPONSIBILITIES

Provide the OPR documentation to the CxA and Contractor for information and use.

Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.

Provide the BoD documentation, prepared by Architect/Engineer and approved by Owner, to the CxA and Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

CONTRACTOR'S RESPONSIBILITIES

General Contractor or Construction Manager shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:

Attend commissioning team meetings held on a variable basis.

Integrate and coordinate commissioning process activities with construction schedule. Cooperate with the CxA for resolution of issues recorded in the Issues Log.

Complete construction checklists (Pre-Functional Test Checklists, manufacturer and contractor startup sheets and checklists, test reports, TAB reports, etc.) as Work is completed and provide to the CxA on a weekly basis or other schedule as mutually agreed to at the Commissioning Kick-off Meeting.

Review and accept commissioning process test procedures (Functional Performance Tests) provided by the CxA.

Complete Pre-Verification Tests using the FPT procedures.

Prepare and submit to CxA the *Certificate of Readiness for Functional Performance Testing*.

Perform and complete commissioning Functional Performance Test procedures as directed by CxA.

Evaluate performance deficiencies identified in test reports and, in collaboration with the entities responsible for system and equipment installation, recommend and provide corrective action.

Provide owner training as required by the Contract Documents and provide documentation of the training to the CxA.

Provide information requested by the CxA for final commissioning documentation.

Participate in review of building and system operation 8-10 months after completion.

CxA'S RESPONSIBILITIES

Organize and lead the commissioning team.

Provide draft initial commissioning plan and update throughout project.

Convene commissioning team meetings, as needed.

Provide project specific construction checklists and functional performance test procedures to the Contractor for completion and incorporation into the Work of the Project.

Verify the completion of commissioning process activities using random sampling. The sampling rate may vary from 1 to 100 percent. Verification will include, but is not limited to, equipment submittals, installation, construction checklists, training, operation and maintenance data, tests, and test reports to verify compliance with the OPR. When a random sample does not meet the requirement, the CxA will report the failure in the Issues Log.
Prepare and maintain the commissioning Issues Log.

Witness major equipment start-up.

Direct commissioning functional performance testing completed by Contractor.

Compile commissioning related documentation and include it in the final commissioning process report and systems manual.
Verify owner training is complete.

Review of building and system operation 8-10 months after completion.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

SCHEDULE OF SYSTEMS TO BE COMMISSIONED

HVAC Systems and Controls

Service (Domestic) Water Heating Systems

Lighting Control Systems

**CONTRACTOR'S CERTIFICATE OF READINESS
FOR COMMISSIONING FUNCTIONAL PERFORMANCE TESTING**

It is the responsibility of the Contractor to verify the following pre-requisite items are complete in preparation for the Commissioning Authority (CxA) to perform Functional Testing. Every item on this list must be initialed and a signed copy must be received by the CxA prior to arriving on the job site. Please read thoroughly, initial next to the item below and sign as requested.

System(s) to be Commissioned: HVAC and Controls, Service Hot Water & Lighting Controls

Initial each item below:

_____ I verify that the system(s) to be commissioned, including all ductwork, piping, electrical, plumbing, and interfaces to other systems is complete and installed. Issues previously identified by the CxA that could prevent Functional Testing have been resolved.

_____ I verify that all manufacturers' field services, factory representative tests and inspections, and factory authorized startup services have been completed as specified and that reports documenting the results of these services have been provided to the CxA.

_____ I verify that for HVAC systems, all duct pressure testing, duct cleaning, pipe pressure testing, and pipe flushing have been completed in accordance with the Contract Documents.

_____ I verify that for HVAC and Domestic Hot Water systems, all Test and Balance work is complete and all issues that could impact Functional Performance Testing have been corrected and that the CxA has been provided with a TAB report.

_____ I verify that the Lighting Controls Systems have been started-up, pre-tested, calibrated, and inspected and are operating according to the Contract Documents.

_____ I verify that the systems being tested are online and communicating with the BAS and that the BAS is interfaced with all other systems that require Functional Performance Testing.

_____ I verify that the BAS contractor has completed the calibration of and point-to-point checks of all sensors and devices, and has completed checks of all devices (dampers, control valves, etc.) for proper operation, fail position, and verification of no leakage.

_____ I verify that the BAS contractor has completed a check of graphics and/or can provide the necessary reports exported from the BAS to confirm testing results.

_____ I verify that the BAS contractor has programmed the system for all sequences of operation, set points, alarms, and occupancy schedules.

_____ I verify that I have reviewed the scheduled list of activities on the days that Functional Performance Testing is to take place and made the necessary notifications and coordination to ensure there are no restrictions to testing.

I understand that if the system(s) listed are not properly prepared for Functional Performance Testing as verified above, necessitating one or more return visits, the Contractor may be charged by the Owner for the cost of the trip, set at \$250/hr plus travel expenses.

Print Name, Title & Company _____

Signature _____

Date _____

END OF SECTION

Page left intentionally blank

**SECTION 024100
DEMOLITION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Building demolition excluding removal of hazardous materials and toxic substances.
- B. Selective demolition of built site elements.
- C. Selective demolition of building elements for alteration purposes.
- D. Abandonment and removal of existing utilities and utility structures.

1.02 RELATED REQUIREMENTS

- A. Section 011000 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 011000 - Summary: Description of items to be salvaged or removed for re-use by Contractor.
- C. Section 015713 - Temporary Erosion and Sediment Control.
- D. Section 016000 - Product Requirements: Handling and storage of items removed for salvage and relocation.
- E. Section 017000 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.
- F. Section 017419 - Construction Waste Management and Disposal: Limitations on disposal of removed materials; requirements for recycling.

1.03 REFERENCE STANDARDS

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards; current edition.
- B. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations; 2013.

1.04 SUBMITTALS

- A. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

1.05 QUALITY ASSURANCE

- A. Demolition Firm Qualifications: Company specializing in the type of work required.
 - 1. Minimum of 10 years of documented experience.

PART 2 PRODUCTS

PART 3 EXECUTION

3.01 SCOPE

- A. Remove the entire building designated on drawings.
- B. Remove all other paving and curbs as indicated on drawings.
- C. Within area of new construction, remove foundation walls and footings to a minimum of 2 feet below finished grade.
- D. Remove concrete slabs on grade as indicated on drawings.
- E. Remove manholes and manhole covers, curb inlets and catch basins.
- F. Remove other items indicated, for salvage, relocation, recycling, and disposal.
- G. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as required so that required rough grade elevations do not subside within one year after completion.

3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
 - 1. Obtain required permits.
 - 2. Use of explosives is not permitted.
 - 3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
 - 4. Provide, erect, and maintain temporary barriers and security devices.
 - 5. Use physical barriers to prevent access to areas that could be hazardous to workers or the public.
 - 6. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
 - 7. Do not close or obstruct roadways or sidewalks without permit.
 - 8. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
- B. Do not begin removal until receipt of notification to proceed from Owner.
- C. Do not begin removal until built elements to be salvaged or relocated have been removed.
- D. Do not begin removal until vegetation to be relocated has been removed and specified measures have been taken to protect vegetation to remain.
- E. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
- F. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.
- G. Hazardous Materials: Comply with 29 CFR 1926 and state and local regulations.
- H. Perform demolition in a manner that maximizes salvage and recycling of materials.
 - 1. Dismantle existing construction and separate materials.
 - 2. Set aside reusable, recyclable, and salvageable materials; store and deliver to collection point or point of reuse.

3.03 EXISTING UTILITIES

- A. Protect existing utilities to remain from damage.
- B. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- C. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- D. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- E. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- F. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

3.04 SELECTIVE DEMOLITION FOR ALTERATIONS

- A. Separate areas in which demolition is being conducted from other areas that are still occupied.
- B. Maintain weatherproof exterior building enclosure except for interruptions required for replacement or modifications; take care to prevent water and humidity damage.

- C. Protect existing work to remain.
 - 1. Repair adjacent construction and finishes damaged during removal work.

3.05 DEBRIS AND WASTE REMOVAL

- A. Remove debris, junk, and trash from site.
- B. Remove from site all materials not to be reused on site; comply with requirements of Section 017419 - Waste Management.
- C. Leave site in clean condition, ready for subsequent work.
- D. Clean up spillage and wind-blown debris from public and private lands.

END OF SECTION 024100

This page intentionally left blank

SECTION 031000 -CONCRETE FORMING AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes, but is not limited to, the design, engineering, construction and removal of formwork required for cast-in-place concrete as shown on the drawings and specified herein.
- B. Related Sections include, but are not limited to, the following:
 - 1. Section 033000 "Cast-In-Place Concrete" for finishes.
- C. Work Installed and Furnished by Others:
 - 1. Install built-in anchors, inserts, and bolts for connection of other materials; sleeves, thimbles, and dovetail anchor slots, plates, frames, seats and all other embedded items including Owner furnished items.
 - 2. Coating of forms and other surfaces as required by this Section.

1.3 DEFINITIONS

- A. Formwork: The total system of support of freshly placed concrete, including the mold or sheathing that contacts the concrete, as well as supporting members, hardware, and necessary bracing.

1.4 ACTION SUBMITTALS

- A. Product Data: Submit, for record only, not for approval, data for each type of product and material indicated including others as requested by Architect. Substitutions for specified items or manufacturers are to be submitted in accordance with Section 1 and will be subject to approval, rejection or other appropriate action.
- B. Formwork Shop Drawings: Prepare shop drawings in compliance with ACI 301 and ACI 347R. If requested by the Architect, submit shop drawings showing general construction of forms for concrete permanently exposed to view; including jointing, special form joints or reveals, location and pattern of form tie placement, and other items that visually affect exposed concrete. Architect's review is for general

architectural applications and features only. Formwork design for safety, structural adequacy and efficiency is Contractor's responsibility.

- C. Shoring and reshoring shop drawings, including for precast prestressed concrete framing: Submit signed and sealed shop drawings prepared by a Delegated Engineer experienced in such work and licensed in the State of Florida. The drawings shall conform to ACI 301 and ACI 347R and contain, as a minimum, the location, size and type of all shoring, reshoring, mud sills, blocking, temporary lateral bracing and other accessories necessary to safely support and brace the structure during construction. The drawings shall also show the sequence of installation, load relief and removal. Use a safety factor of 2 for metal shores and 3 for wood shores. Submit drawings to the Architect, Engineer, Special Inspector and Building Official for record only. Shoring and reshoring design and construction is the sole responsibility of the Contractor and his Engineer.
1. Design structural members to support form facing materials without deflection. Design camber into formwork as required to compensate for anticipated deflections due to weight and pressures of fresh concrete and construction loads for longspan members without intermediate supports.
 2. Prior to each concrete pour, the Delegated Engineer who prepares the shoring and reshoring drawings or his authorized representative shall inspect the shoring and reshoring. He shall provide a field report of each inspection to the Contractor and Special Inspector prior to leaving the site. Upon completion of the project, he shall submit a signed and sealed statement to the Architect and Special Inspector that this work was performed in accordance with his plans and specifications.

1.5 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For the form-release agent, signed by manufacturer.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Delegated Engineer Qualifications: A licensed engineer who is legally qualified to practice in the State of Florida and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for formwork and shoring and reshoring installations that are similar to those indicated for this Project in material, design, and extent.
- C. Codes and Standards: Comply with the following, unless more stringent provisions are indicated:
1. Florida Building Code, 8th Edition.
 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 3. ACI 301, "Specifications for Structural Concrete."

4. ACI-318, "Building Code Requirements for Structural Concrete and Commentary."
5. ACI 347, "Guide to Formwork for Concrete."
6. ACI SP-4, "Formwork for Concrete."
7. American Forest and Paper Association, "National Design Specifications for Wood Construction."
8. American Plywood Association (APA), "Plywood Design Specification" (Form Y-510); "Concrete Forming: (Form V345)"
9. National Institute of Standards and Technology (NIST), "Voluntary Product Standard PS 1-07 for Construction and Industrial Plywood" (Form V995).

1.7 JOB CONDITIONS AND COORDINATION OF TRADES

- A. General: It is the Contractor's sole responsibility to coordinate with all trades for the setting of sleeves, anchor bolts, dovetail slots, inserts, frames, flashing, reglets, pipes, ducts and other embedded items and provide all openings required for installation of other work in accordance with the Contractor's shop drawings and the Contract Documents.
- B. Structural Integrity: Provide no sleeves or openings in structural members unless shown on the structural drawings or approved by the Architect.
- C. Inspection: Architect may inspect formwork at any time and may reject formwork if forms do not conform to the lines, levels, and tolerances as required in this Section, the shop drawings or the Design Drawings. If formwork is rejected, the Contractor must repair or replace the rejected portion with no additional cost to the Owner.

PART 2 - PRODUCTS

2.1 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 1. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. APA Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Stable Soil: In the event stable soil is encountered and straight-line embankments can be maintained, concrete foundations may be placed into accurately excavated earth trenches, free from water, debris, or loose dirt. Excavations shall be minimum 2" wider and longer than specified.

2.2 RELATED MATERIALS

- A. Chamfer Strips: Wood, metal, PVC, or rubber strips, 1/2 by 1/2 inch, minimum.
- B. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of the exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes not larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties with integral water-barrier plates to walls indicated to receive damp proofing or waterproofing.
- E. Accessories: Provide necessary anchors, form ties, shores, construction joints, scaffolds, and bracing as required to install forms. Provide construction joints, control joints, expansion joints and waterstops where indicated on the drawings.
 - 1. Form Joint Gasket: Closed cell rubber sponge. Take care that form joints are sealed from leakage of cement paste and moisture.
 - 2. Material to form drips, reveals, rustification strips or weep holes shall be extruded plastic.

PART 3 - EXECUTION

3.1 INSTALLATION OF FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 and ACI 347, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until concrete structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
 - 1. Surface Finish-1.0: ACI 117 Class D, 1 inch for permanently concealed rough-formed finished surfaces.

2. ACI 117 Class C, 1/2 inch: Other rough-formed finished surfaces.
 3. Surface Finish-2.0: ACI 117 Class B, 1/4 inch for rough-formed finished surfaces intended to receive plaster.
 4. Surface Finish-3.0: ACI 117 Class A, 1/8 inch for smooth-formed finish surfaces exposed to public view.
- D. Construct forms tight enough to prevent loss of concrete mortar.
1. Minimize joints.
 2. Exposed Concrete: Symmetrically align joints in forms.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
1. Kerf wood inserts for forming keyways, reglets, recesses, and the like, for easy removal.
- F. Do not use rust-stained steel form-facing material.
- G. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- H. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- I. Chamfer exterior corners and edges of permanently exposed concrete.
- J. At construction joints, overlap forms onto previously placed concrete not less than 12 inches.
- K. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- L. Construction and Movement Joints:
1. Construct joints true to line with faces perpendicular to surface plane of concrete.
 2. Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 3. Place joints perpendicular to main reinforcement.
 4. Locate joints for beams, slabs, joists, and girders as indicated on the drawings.
 5. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 6. Space vertical joints in walls as indicated on Drawings.

- a. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
- M. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- N. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- O. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.2 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. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC 303.
 - 2. If shown on Architectural drawings, install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.3 EARTH FORMS

- A. Hand trim sides and bottom of earth forms. Remove loose soil and rocks and compact to specified density prior to placing reinforcing or concrete. Moisten sides and bottom immediately prior to concrete placement. Comply with OSHA's "Trench Safety Act".

3.4 REMOVING AND REUSING FORMS

- A. General: Formwork, for sides of beams, walls, columns, and similar parts of the Work, that does not support weight of concrete may be removed after cumulatively curing at not less than 50 degrees F for 24 hours after placing concrete provided concrete is hard enough to not be damaged by form-removal operations and provided curing and protection operations are maintained.
- B. Leave formwork, for beam soffits, joists, slabs, and other structural elements, that supports weight of concrete in place until concrete has achieved the strength and age listed in the Structural Notes.
 - 1. Determine compressive strength of in-place concrete by testing representative field or laboratory-cured test specimens according to ACI 301.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.

- C. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. The Architect's approval is required for reusing forms for exposed surfaces. Apply new form-release agent.
- D. Reuse forms to greatest extent possible without damaging structural integrity of concrete and without damaging aesthetics of exposed concrete. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.5 SHORES AND RESHORES

- A. Comply with ACI 318, ACI 301, and recommendations in ACI 347R for design, installation, and removal of shoring and reshoring.
 - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. Plan sequence of removal of shores and reshores to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection. Shores must be readily adjustable so that settlement during concrete placement may be taken up at once.

3.6 FIELD QUALITY CONTROL

- A. Prior to each concrete pour, the Delegated Engineer or his authorized representative shall inspect the shoring and reshoring and submit a signed inspection report to the Special Inspector and Contractor stating that the work is in general compliance with the shoring and reshoring drawings. As a minimum, the shoring and reshoring report shall contain the following:
 - 1. Name and location of Project, name of Delegated Engineer and his field representative, Permit Number, date, time of day, and working conditions, including weather and temperature.
 - 2. Description of items requiring correction.
 - 3. Accepted deviations from shoring and reshoring drawings.
 - 4. Areas accepted and released for concrete pour.

END OF SECTION 031000

This page intentionally left blank

SECTION 032000 – CONCRETE REINFORCING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes, but is not limited to, concrete reinforcement bars, welded-wire reinforcing and necessary accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: Submit, for record only, not for approval, data for each type of product and material indicated including others as requested by Architect. Indicate manufacturing process used for steel reinforcing. Substitutions for specified items or manufacturers are to be submitted in accordance with Division 1 and will be subject to approval, rejection or other appropriate action.
- B. Steel Reinforcement Shop Drawings: Complete details of fabrication, bending, and placement, prepared according to ACI 315, "Details and Detailing of Concrete Reinforcement" and ACI SP-66 "Detailing Manual". Include bar sizes, length, material, grade, bar schedules, stirrup spacing, bent bar diagrams, arrangement location of splices, lengths of lap splices, details of mechanical splice couplers, details of welding splices, tie spacing, hoop spacing, and supports of concrete reinforcement.
 - 1. Do not reproduce Structural Drawings for use as shop or placement drawings without prior approval of the Architect.
- C. Construction Joint Layout: Indicate proposed construction joints required to build the structure.
 - 1. Location of construction joints is subject to approval of the Architect.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
 - 1. Reinforcement To Be Welded: Welding procedure specification in accordance with AWS D1.4.

- B. Material Certificates: Signed by manufacturers and contractor certifying that the steel reinforcement and reinforcement accessories comply with requirements of the Contract Documents. Unidentifiable steel is prohibited.
- C. Material Test Reports: For the following, from a qualified testing agency:
 - 1. Steel Reinforcement:
 - a. For reinforcement to be welded, mill test analysis for chemical composition and carbon equivalent of the steel in accordance with ASTM A706.
 - 2. Mechanical splice couplers.

1.5 QUALITY ASSURANCE

- A. Codes and Standards: Comply with the following, unless more stringent provisions are indicated:
 - 1. Florida Building Code, 8th Edition.
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - 3. ACI 301, "Specifications for Structural Concrete."
 - 4. ACI 315, "Details and Detailing of Concrete Reinforcement."
 - 5. ACI-318, "Building Code Requirements for Structural Concrete and Commentary."
 - 6. "CRSI Manual of Standard Practice."
- B. Welding Qualifications: Qualify procedures and personnel in accordance with AWS D1.4.
- C. Installer Qualifications: An experienced installer who has completed concrete work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle steel reinforcement to prevent bending and damage and to avoid damaging coatings on steel reinforcement.
 - 1. Deliver reinforcement to the job site bundled, tagged and marked. Use durable metal or embossed plastic tags indicating bar size, lengths, and reference information corresponding to markings shown on placement drawings. Do not store reinforcement in contact with earth.

PART 2 - PRODUCTS

2.1 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A615, Grade 60, deformed.

- B. Low-Alloy-Steel Reinforcing Bars: ASTM A706, deformed.
- C. Headed-Steel Reinforcing Bars: ASTM A970.
- D. Plain-Steel Welded-Wire Reinforcement: ASTM A1064, plain, fabricated from as-drawn steel wire into flat sheets. Rolls are not acceptable.

2.2 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: Plain-steel bars, ASTM A615, Grade 60, plain-steel bars, cut bars true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.
 - 2. For welded wire fabric in slabs on grade use precast slab bolsters, concrete brick or sand plate chairs spaced no farther than 3'-0" c/c.
- C. Mechanical Splices for Reinforcing Steel: Reinforcing bar splicing system designed to develop minimum 1.25 Fy of the reinforcing bars in both tension and compressions, conforming to ACI 318. Splicing system shall be listed by the International Code Council (ICC). Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, the following:
 - 1. Screw-lock bar coupling sleeve system.
 - a. Dayton Superior Bar Lock Coupling System.
 - b. Erico Lenton Lock Mechanical Rebar System.
- D. Reinforcing Dowel Replacement: Subject to compliance with requirements, products that may be incorporated into the work include, but are not limited to, the following:
 - 1. Dayton Superior Taper-Lock Form Saver.
 - 2. Erico Lenton Form Saver.
- E. Steel Tie Wire: ASTM A1064, annealed steel, not less than 00508 inch in diameter.

2.3 FABRICATING REINFORCEMENT

- A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."
- B. Shop bend and fabricate reinforcing bars to conform with shapes and dimensions indicated on drawings. In case of errors, do not bend or straighten reinforcement without prior approval of Structural Engineer. Make all bends cold.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protection of In-Place Conditions:
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that reduce bond to concrete.

3.2 INSTALLATION OF STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
- B. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover specified on the drawings. Do not tack weld crossing reinforcing bars.
- C. Preserve clearance between bars of not less than 1", not less than one bar diameter, or not less than 1-1/3 times size of large aggregate, whichever is greater.
- D. Provide concrete coverage in accordance with ACI 318.
- E. Tie bars and bar supports together with 16-gauge wire and set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- F. Splices: Lap splices as indicated on Drawings.
 - 1. Bars indicated to be continuous, and all vertical bars shall be lapped not less than 48 bar diameters at splices, or 24 inches, whichever is greater.
 - 2. Stagger splices in accordance with ACI 318.
 - 3. Mechanical Splice Couplers: Install in accordance with manufacturer's instructions.
 - 4. Weld reinforcing bars in accordance with AWS D1.4, where indicated on Drawings.
- G. Install welded-wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging (3'-0" o.c. max.). Lap edges and ends of adjoining sheets at least two mesh spacings. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with 16-gauge wire.
- H. Splices: Locate only where indicated on the drawings or approved shop drawings except with prior approval of Engineer.
 - 1. For standard splices, lap ends, placing bars in contact, and tightly wire tie. See drawings for lap lengths.

2. Install mechanical splicing components in accordance with manufacturer's instructions.
 3. Do not weld splices.
- I. Provide template for all column dowels.
 - J. Do not bend bars embedded in hardened or partially hardened concrete without approval from the Structural Engineer.
 - K. Do not weld reinforcing bars unless specifically shown. Where shown comply with AWS D1.4. Bars to be welded shall conform to ASTM A706.

3.3 JOINTS

- A. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
 1. Place joints perpendicular to main reinforcement.
 2. Continue reinforcement across construction joints unless otherwise indicated.
 3. Do not continue reinforcement through sides of strip placements of floors and slabs.

3.4 INSTALLATION TOLERANCES

- A. Comply with ACI 117.

END OF SECTION 032000

This page intentionally left blank

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes, but is not necessarily limited to, concrete, concrete materials, mix design, placement procedures, curing and finishes.
- B. Related Sections include, but are not necessarily limited to, the following:
 - 1. Section 031000 "Concrete Forming and Accessories".
 - 2. Section 032000 "Concrete Reinforcing."
 - 3. Section 312000 "Earthmoving" for drainage fill under slabs-on-grade, including grade beams and pile caps.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Product Data: Submit, for record only, not for approval, data for each type of product and material indicated including admixtures, patching compounds, waterstops, joint systems, curing compounds, and others as requested by Architect.
- B. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments. Substantiating data to be no older than one year from date of submittal for each mix design.
 - 1. Indicate amounts of mix water to be withheld for later addition at Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For the following:

1. Installer:
 - a. ACI Flatwork Technician certifications.
 - b. Written evidence that flatwork placer/finisher has not less than (3) years continuous experience and a minimum of (5) projects in the successful placement and finishing of concrete slabs with flatness and levelness requirements equal to or higher than those specified for this project.
 - c. Written evidence of 10 projects that Installer has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
2. Ready-Mixed Concrete Manufacturer: NRMCA's "Certification of Ready Mixed Concrete Production Facilities".

B. Material Certificates: Signed by manufacturers and contractor certifying that each of the following items complies with requirements of the Contract Documents:

1. Cementitious materials and aggregates.
2. Admixtures.
3. Floor and slab treatments.
4. Waterstops.
5. Curing materials.
6. Bonding agents.
7. Adhesives.
8. Vapor retarders.
9. Repair materials.
10. Epoxy joint filler.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An qualified installer who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance. Installer shall employ on Project personnel qualified as ACI Flatwork Technician and Finisher and a supervisor who is an ACI Concrete Flatwork Technician.
- B. Ready-Mixed Concrete Manufacturer Qualifications: A firm experienced in the successful manufacturing ready-mixed concrete products complying with ASTM C94 requirements for production and delivery, facilities and equipment.
1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's "Certification of Ready Mixed Concrete Production Facilities".
 2. Manufacturer must be F.D.O.T. certified.
- C. Codes and Standards: Comply with the following, unless modified by requirements in the Contract Documents:
1. Florida Building Code, 8th Edition.

2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
3. ACI 211.1 "Standard Practice for Selecting Proportions for Normal, Heavyweight and Mass Concrete."
4. ACI 301, "Specification for Structural Concrete for Buildings."
5. ACI-304, "Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete."
6. ACI-305.1, "Guide to Hot Weather Concreting."
7. ACI-306.1, "Guide to Cold Weather Concreting."
8. ACI-308, "Guide to External Curing of Concrete."
9. ACI-309, "Guide for Consolidation of Concrete."
10. ACI-311.4, "Guide for Concrete Inspection."
11. ACI-318, "Building Code Requirements for Reinforced Concrete."

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with ASTM C94 and ACI 301.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL

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

2.2 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products specified.
 2. Products: Subject to compliance with requirements, provide one of the products specified.
 3. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.
 4. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.

2.3 CONCRETE MATERIALS

- A. Source Limitations:

1. Obtain all concrete mixtures from a single ready-mixed concrete manufacturer for entire Project.
 2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant.
 3. Obtain aggregate from single source.
 4. Obtain each type of admixture from single source from single manufacturer.
- B. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
1. Portland Cement:
 - a. ASTM C150, Type I/II
 - b. Slabs on Grade: Type I or Type II with a C3A content less than 8%.
- C. Pozzolans:
1. Fly Ash: ASTM C618, Class C or F.
- D. Blended Hydraulic Cement: ASTM C595, Type IP, portland-pozzolan cement.
- E. Blended Hydraulic Cement: ASTM C595, Type IL, Portland-limestone cement.
- F. Normal-Weight Aggregate: Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
1. Fine Aggregate: Natural quartz sand or manufactured sand from local stone aggregates conforming to ASTM C33, produced from F.D.O.T. approved sources, with fineness modulus not less than 2.4, and having a proven service record.
 2. Coarse Aggregate: Clean, washed, sound, crushed natural stone products produced from F.D.O.T. approved sources. Free from salt, clay, mud, loam or other foreign matter. Conform to ASTM C33; sizes No. 67 (3/4 inch) or No. 57 (1 inch), No. 8 or No. 89 (3/8 inch), and No. 467 (1 1/2 inch). Use largest size practical for members being cast.
 - a. Class: Negligible weathering region, class per ASTM C33. [1N]
- G. Water: Potable and complying with ASTM C94.

2.4 CONCRETE ADMIXTURES

- A. General: Provide admixtures produced by acceptable manufacturers and used in compliance with the manufacturer's printed directions. Use only admixtures which have been incorporated and tested in the accepted mixes, unless otherwise authorized in writing by the Architect. Do not use admixtures which increase the shrinkage properties of concrete. Submit substantiating data, if requested.
- B. Air-Entraining Admixture: ASTM C260.

- C. Water-reducing admixture: Conform to ASTM C494, Type A, D or E free of chlorides, fluorides, or nitrates, except for those attributable to the water used in manufacturing. Use in all structural concrete.
- D. High Range Water Reducing Admixture: Conform to ASTM C494, Type F or Type G and ASTM C1017, Type I or II. Formulate HRWR based on polycarboxylate technology. The admixture is to be added to the concrete mix after initial mixing has taken place. If added at the batch plant HRWR to have an effective life without redosing (third generation HRWR) of at least 2 Hours. If added at the jobsite, the addition shall be by certified technicians employed by the concrete supplier or an authorized representative of the admixture manufacturer. This admixture is in addition to and not a substitute for any other admixtures specified elsewhere.
- E. Calcium Chloride: Do not use calcium chloride in concrete. Do not use any admixtures which contribute free chloride ions to the concrete mix.

2.5 VAPOR RETARDERS

- A. Sheet Vapor Retarder, Class A: ASTM E1745: Include manufacturer's recommended adhesive or pressure-sensitive tape.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Fortifiber Building Systems Group; Moistop Ultra 15.
 - b. ISI Building Products; Viper VaporCheck II 15-mil.
 - c. Raven Industries Inc.; VaporBlock VB15.
 - d. Reef Industries, Inc.; Griffolyn 15 Mil.
 - e. Stego Industries, LLC; Stego Wrap Vapor Barrier (15-Mil)
 - f. W.R. Meadows, Inc.; Perminator 15-mil.

2.6 LIQUID FLOOR TREATMENTS

2.7 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corporation; MasterKure ER 50.
 - b. Euclid Chemical Company (The); an RPM company; Eucobar.
 - c. Laticrete International, Inc.; L&M E-Con.
 - d. Nox-Crete Products Group; Monofilm.
 - e. SpecChem, LLC; Spec Film.
- B. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, (or Type 2) Class B, dissipating. The film must chemically break down in a 4 to 6 week period after application.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. Anti-Hydro International, Inc; A-H Curing Compound #2 DR WB.
- b. ChemMasters, Inc; Safe-Cure Clear DR.
- c. Euclid Chemical Company (The) an RPM company; Kurez DR VOX.
- d. Lambert Corporation; AQUA KURE - CLEAR.
- e. Laticrete International, Inc.; L&M CURE R.
- f. TK Products; DC WB Dissipating Cure 2519.
- g. W.R. Meadows, Inc; 1100-CLEAR.

- C. Liquid Membrane-Forming Cure and Seal Compound: VOC Compliant, conforming to ASTM C309, Type 1, Class B and ASTM C1315, Type 1, Class A or B. The compound shall be a clear styrene acrylate type, 25% solids content minimum, and have test data from an independent testing laboratory indicating to a maximum moisture loss of .040 grams per square cm. When applied at a coverage rate of 200 sq. ft. per gallon.

1. Products: Subject to compliance with requirements, provide one of the following:

- a. ChemMasters, Inc; Polyseal WB.
- b. Euclid Chemical Company (The); an RPM company; Super Diamond Clear VOX.
- c. Kaufman Products, Inc; Krystal 25 Emulsion.
- d. Lambert Corporation; Crystal Clear Seal 1315 WB.
- e. Laticrete International, Inc.; L&M Dress & Seal WB 25.
- f. Metalcrete Industries; Metcure 30.
- g. Nox-Crete Products Group; Cure & Seal 250E.
- h. Right Pointe; Right Sheen WB30.
- i. SpecChem, LLC; Cure & Seal WB 25.
- j. TK Products; TK-Bright Kure & Seal 1315 VOC.
- k. Vexcon Chemicals Inc.; StarSeal 1315.
- l. W.R. Meadows, Inc; Vocomp-30.

- D. Absorptive Cover: AASHTO M182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

- E. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.

- F. Water: Potable or complying with ASTM C1602.

2.8 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D1751, asphalt-saturated cellulosic fiber or ASTM D1752, cork or self-expanding cork.
- B. Bonding Agent: ASTM C1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- C. Epoxy-Bonding Adhesive: ASTM C881, two-component, 100% solid, epoxy resin, capable of humid curing and bonding to damp surfaces, of class and grade to suit requirements. Use Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- D. Reglets: Fabricate reglets of not less than 0.0217-inch thick galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- E. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.9 CEMENT GROUT AND DRYPACK

- A. Prepackaged Non-Shrink Non-Metallic Non-Gaseous Grout: ASTM C1107, Grade B or C at a fluid consistency (flow cone) of 20 to 30 seconds. Grout shall be bleed free and attain 7500 psi compressive strength in 28 days at fluid consistency. Use for structural repairs.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. BASF Corporation; Masterflow 928.
 - b. Euclid Chemical Company (The) an RPM company; NS Grout.
 - c. Five Star Products, Inc.; Fluid Grout 100.
 - d. Fosroc; Conbextra HF.
 - e. Lambert Corporation; Vibropruf #11.
 - f. Laticrete International, Inc; L&M Crystex.
 - g. Sika Corporation; Sikagrout 212.
- B. Cement Grout: Mix one part Portland cement, 2-1/2 parts fine aggregate, and enough water and liquid bonding agent in a 50/50 mix for required consistency depending on use. Consistency may range from mortar consistency to a mixture that will flow under its own weight. Use for leveling, preparing setting pads of beds, for filling non-structural voids, and similar uses. Do not use for grouting under bearing plates or structural members in place.
- C. Drypack: Mix one part Portland cement, 2 parts fine aggregate, and enough water and liquid bonding agent in a 50/50 mix to hydrate cement and provide a mixture that can be molded with hands into a stable ball (a stiff mix). Do not mix more than can be used in 30 minutes. Use for patching tie holes and large surface defects in concrete.

2.10 SLAB REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.

1. Cement Binder: ASTM C150, Portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.
 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C109.
- B. Repair Topping: Traffic-bearing, cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations. For use on slabs not receiving finishes.
1. Cement Binder: ASTM C150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C219.
 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C109.

2.11 CONCRETE MIXTURES

- A. Concrete for all parts of the concrete work shall be homogenous, and when hardened, possess the required strength, durability, water tightness, appearance, resistance to deterioration and abrasion, and other qualities as specified or required.
- B. Mix proportioning: Proportion concrete according to ACI 211.1. Trial mixes shall be designed by the testing laboratory approved by Architect or designed by the producer and witnessed and tested by the testing laboratory, in accordance with ACI 301 Section 4. Proportioning on the basis of field experience with complete statistical data, not more than one year old from date of submittal and spanning no less than 60 calendar days, to confirm mixes is acceptable.
- C. Provide concrete which will develop ultimate compressive strength at 28 days equal to that noted on drawings and listed below.
- D. Concrete Grades:

| Mix No. | Strength | Air Yes/No | Max. Aggregate Size | W/C or W/(C&P)* |
|---------|----------|---------------|------------------------|-----------------|
| 1 | 3000 | Y | 1" | 0.64 |
| 2 | 3000 | N | 1" | 0.64 |
| 7 | 4000 | Y | 1" | 0.54 |
| 8 | 4000 | N | 1" | 0.54 |
| 9 | 4000 | Y | 3/8" | 0.52 |

* Water-Cementitious Ratio: Concrete mixes are required to comply with both the minimum strength and maximum water-cementitious ratios indicated above. Maximum W/C or

W/(C&P) is required as an indication of overall concrete quality and may well produce strengths higher than the minimum required.

E. Concrete Use:

| Element | Mix No. | Exposure Class* |
|-----------------------------|---------|-----------------|
| 1. Footings | 2 | F0 |
| 2. Wall Footings | 2 | W0 |
| 3. Slab on Grade | 1, 2 | S0 |
| 4. Columns and Poured Walls | 7 | F0 |
| 5. Elevated Slabs and Beams | 8 | C1 |
| 6. Tie Beams, Tie Columns | 9 | F0 |
| 7. Slabs on Steel Deck | 8 | C1 |

* Letter in Exposure Category denotes Exposure Class:

- F: Freezing and thawing.
- S: Sulfate.
- W: Concrete in contact with water.
- C: Corrosion protection of reinforcement.

F. Design Slump:

1. General: 4 inches.
2. Concrete Containing High Range Water Reducer: 2 to 3 inches before addition of HRWR, 8 inches after.
3. Slump Tolerance: Plus/minus 1 inch.
4. Slump Of Corrosion Inhibited Concrete: 7 ± 2 , inch with the use of HRWR.

G. Chloride Ion Content for Corrosion Protection: Determine the chloride content of the component concrete materials, excluding admixtures, and provide this information to the Architect when submitting mix design. Design mixes will not be approved when the sum of chloride content of component materials indicates that the concrete mix derived from those materials will have a water soluble chloride ion content exceeding 0.1% for concrete exposed to the elements and 0.2% for concrete protected from the elements, when percent is determined by weight of cement. When the source of any component material for the concrete is changed or when the design mix is altered, a chloride content determination test shall be made immediately. Resubmit the altered design mix for approval by the Architect.

H. Cementitious Materials: Minimum Portland cement content of any concrete mix containing slag cement is 280 lbs., for all other concrete mixes, minimum portland cement content is 423 lbs. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Provide concrete mixes having a fly ash content of 15% to 20%, by weight, of cementitious material.

I. Air Content: Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an entrained air content of 3 to 5 percent, except, 1 to 3 percent entrapped air for concrete to receive a hard trowel finish, (floor slabs), unless otherwise indicated.

- O. Admixtures: Use admixtures according to manufacturer's written instructions.
 - 1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in all structural concrete.
 - 2. Use water-reducing and retarding admixture when ambient temperature is 85 degrees F or higher and/or low humidity, or other adverse placement conditions exist.
 - 3. Use high range water-reducing admixture in pumped concrete, walls 8" thick and less, at areas of reinforcing steel congestion, and as required for placement and workability, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.40.
- P. Adjustment to Concrete Mixes: Mix design adjustments may be requested by contractor when characteristics of materials, job conditions, weather, test results, or other circumstances warrant; at no additional cost to Owner and as accepted by Architect. Laboratory test data for revised mix design and strength results must be submitted to and accepted by Architect before using in work.

2.12 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C94, and furnish batch ticket information.
- B. Mixing and Delivery Time: When air temperature is between 95 and 100 degrees F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 100 degrees F, reduce mixing and delivery time to 60 minutes.
 - 1. Concrete Containing Corrosion Inhibitor: Reduce mixing and delivery time to one hour.
- C. Provide batch ticket for each ready-mixed batch discharged and used in the Work, indicating Project identification name and number, date, mix type and number, batch time, mix time, quantity, and amount of water added and amount of water withheld at the plant. Record approximate location of final deposit in structure.

PART 3 - EXECUTION

3.1 VERIFICATION OF CONDITIONS:

- A. Before placing concrete, verify that installation of concrete forms, accessories, and reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide reasonable auxiliary services to accommodate field testing and inspections, acceptable to testing agency, including the following:
 - 1. Daily access to the Work.
 - 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 - 3. Secure space for storage, initial curing, and field curing of test samples, including source of water and continuous electrical power at Project site during site curing period for test samples.
 - 4. Security and protection for test samples and for testing and inspection equipment at Project site.

3.3 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. Use Setting Drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor bolts, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges".
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.
 - 4. Do not provide sleeves or openings in structural members unless shown on the structural drawings or approved by the Architect.

3.4 INSTALLATION OF VAPOR RETARDER

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders in accordance with ASTM E1643 and manufacturer's written instructions. Use below interior floor slabs and as indicated on the Contract Documents.
 - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.
 - 2. Seal penetrations in accordance with vapor retarder manufacturer's instructions.
 - 3. Protect vapor retarder during placement of reinforcement and concrete.
 - a. Repair damaged areas by patching with vapor retarder material, overlapping damages area by 6 inches on all sides, and sealing to vapor retarder.

3.5 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Provide dowels as shown on drawings or as required by Architect. Do not continue reinforcement through sides of strip placements of slabs.
 2. For members 5" thick or more, form keys from preformed galvanized steel, plastic keyway-section forms or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete. Submit detail to Architect for review.
 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs. Allow 4 hours (minimum) between when column or wall is cast and when concrete supported by column or wall is cast.
 5. Space vertical joints in walls at 40 feet o.c. U.O.N. on drawings. Place control joints at 20 feet o.c. between construction joints U.O.N. on drawings. If locations are not shown, locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces. In beams and girders use epoxy-bonding adhesive at locations when fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated on drawings. If requested, the contractor shall prepare and submit to the Architect a joint layout. Construct contraction joints as follows:
1. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades using the "Soff-Cut" early entry dry-cut saws. Cut 1/8 inch wide and 1/4 to 1/3 of slab depth deep joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks. This is usually within 2 hours of final finish at each control joint but not more than 8 hours after completion of concrete pour.
 2. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

2. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Coordinate construction and control joints with requirements of finish material joints.

3.6 CONCRETE PLACEMENT

- A. Complete the following before placing concrete:
1. Excavate and compact subgrade, arrange for compaction testing, spray termite treatment on grade, place vapor barrier and remove excess water.
 2. Secure all formwork. Verify that shoring and reshoring has been inspected and accepted by Delegated Engineer. Moisten wood forms except where form coatings are used.
 3. Accurately locate all steel reinforcement, conduits, outlet boxes, anchors, hangers, sleeves, bolts, expansion joint materials and other embedded items and secure against shifting during concrete placement or consolidation.
 4. Accurately locate bearing pads on true, level, and uniform surfaces and secure against shifting during concrete placement.
 5. Cooperate with other trades and verify that their work is installed.
 6. Repair any damage to vapor retarder.
 7. Notify testing agency to test concrete.
 8. Ensure that all required inspections are performed.
- B. Comply with ACI 301, ACI 304, ACI 308 and ACI 318.
- C. Jobsite Tempering: Place concrete within 1-1/2 hours after introduction of water to mix. Submit time stamped batching tickets upon delivery of concrete to job site.
1. Do not add water to ready-mix concrete except as provided in ASTM C94, Paragraph 12.7. When so allowed, limit addition of water to amount withheld at plant as indicated on batch ticket. Water shall be added prior to initial discharge of concrete. No water may be added once concrete placement has started. Addition of water may only be authorized by Architect, the concrete producer's quality control representative, a preapproved representative of Contractor, or the Special Inspector.
 2. Concrete produced with high range water reducer may only be tempered with additional high range water reducer.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.
1. Maximum height of concrete free fall is 4 feet. Columns up to **8 [10]** feet in height may be poured in one lift. Concrete in columns and walls over **8 [10]** feet may be poured full height with the use of drop chutes or tremies or up to a maximum of 16 feet if HRWR admix concrete is used.

- E. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints.
 - 1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.
 - 2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.
 - 3. Concrete in columns and walls shall be cast at least twenty-four hours before horizontal members they support are cast. Exception: Concrete in tie columns and grout in masonry cells shall be cast at least four hours before beams or slabs are cast on top of masonry.
- F. Deposit and consolidate concrete for slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
 - 1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 - 2. Maintain reinforcement in position on chairs during concrete placement.
 - 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 - 4. Slope surfaces uniformly to drains where required.
 - 5. Begin initial floating using highway bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- G. Pumping: Slumps in excess of six (6) inches at the pump will not be permitted except for concrete produced with HRWR. If placing by means of pump, a specifically designed concrete mix shall be submitted to the Architect for review. No pump lines smaller than 4 inches will be permitted. Exception: A 3" pump line may be used for 8" wide beams and columns cast on top of or between masonry walls or for filling masonry cells.
- H. Cold-Weather Placement: Comply with ACI 306.1 and as follows: Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures. Cold weather is defined as a period when, for more than three (3) consecutive days, the average daily air temperature is less than 40 degrees F and the air temperature is not greater than 50 degrees F for more than 1/2 of any 24-hour period. The average daily air temperature is the average of the highest and lowest temperatures occurring during the period from Midnight to Midnight.
 - 1. When air temperature has fallen to or is expected to fall below 40 degrees F, uniformly heat water and aggregates before mixing to obtain a concrete mixture temperature of not less than 50 degrees F at point of placement.

2. Provide protected and heated environments for onsite storage of test cylinders.
 3. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 4. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators.
 5. Temporary heat devices shall be operated with special care to protect against concentrations of heat, or direct contact with combustion gases. All surfaces within the enclosure shall be kept wet for curing.
- I. Hot-Weather Placement: Place concrete according to recommendations in ACI 305.1 and as follows, except concrete temperature shall not exceed 100 degrees F:
1. Cool ingredients before mixing to maintain concrete temperature below 100 degrees F at time of placement.
 2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
 3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.
 4. Use Type D water reducing admixtures when ambient temperature exceeds 85 degrees F or other adverse placing conditions exist.
- J. Do not place concrete in exposed conditions when it is raining unless adequate protection is provided.

3.7 FINISHING FORMED SURFACES

- A. Rough-Formed Finish ACI 301 Surface Finish SF-2.0: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding 1/4" rubbed down or chipped off. Use for concrete surfaces not exposed to view in the finished work.
- B. Smooth-Formed Finish ACI 301 Surface Finish SF-3.0: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defective areas. Remove fins and other projections exceeding 1/8 inch in height.
1. Apply to concrete surfaces exposed to public view or to be covered with a coating or covering material applied directly to concrete, such as waterproofing, dampproofing, veneer plaster, painting, or staining.
 2. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed finished concrete:
1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.

2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Wall Surfaces Exposed to Public: Provide elastomeric form liner or steel forms for cast-in-place concrete wall surfaces exposed to the general public.
- E. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

3.8 FINISHING FLOORS AND SLABS

- A. General: Comply with recommendations in ACI 302.1R for screeding, restraighening, and finishing operations for concrete surfaces. Do not wet concrete surfaces. Slope surfaces to drains.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
1. Apply scratch finish to surfaces indicated and to surfaces to receive concrete floor topping or mortar setting beds for ceramic or quarry tile, portland cement terrazzo, and other bonded cementitious floor finishes.
- C. Float Finish: Begin floating when bleed water has disappeared and when concrete has stiffened sufficiently to permit operation of power driven floats. Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraighening until surface is left with a uniform, smooth, granular texture and complies with ACI 117 tolerances for conventional concrete.
1. Apply float finish to surfaces indicated, to surfaces to receive trowel finish, and to floor and slab surfaces to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first trowel finish and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighen until surface is free of trowel marks and uniform in texture and appearance. Grind

smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces indicated and to floor and slab surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin film-finish coating system
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated and to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. When concrete is still plastic, slightly scarify surface with a fine broom.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
 1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.
- G. Floor Flatness and Levelness: Finish surfaces to the following tolerances according to ASTM E1155 for a randomly trafficked floor surface and measured within 72 hours and before supporting formwork or shoring is removed:
 1. Scratch finish or Non-Critical Floors, such as Mechanical Rooms, Non-Public Unfinished Areas, Parking Slabs: Specified overall values of flatness, F_F 20; and levelness, F_L 15; with minimum local values of flatness, F_F 15; and levelness, F_L 10.
 2. Float Finish: Specified overall values of flatness, F_F 25; and levelness, F_L 20; with minimum local values of flatness, F_F 17; and levelness, F_L 15.
 3. Carpeted Slabs: Specified overall values of flatness, F_F 25; and levelness, F_L 20; with minimum local values of flatness, F_F 17; and levelness, F_L 15.
 4. Thin or No Floor Covering: Specified overall values of flatness F_F 35; and levelness, $F(L)$ 25; with minimum local values of flatness, F_F 24; and levelness, F_L 17; for suspended slabs.
 5. Specified overall values of flatness, F_F 45; and levelness, F_L 35; with minimum local values of flatness, F_F 30; and levelness, F_L 24.
 6. Specified Overall Value (SOV): F_F 50; and, F_L 25 with minimum local value (MLV): F_F 40 and F_L 17.
- H. Floor Flatness and Levelness Acceptance: The Architect may authorize the testing agency to verify that the specified F_F and F_L numbers have been achieved for any slab pours except for unshored or sloped construction. F_F and F_L Minimum Local Area is defined as any bay delineated by columns. Slabs that do not meet the specified F_F or F_L numbers shall be removed and replaced. Alternatively, the Contractor may propose repairs to the slab or a credit to the Project.

3.9 INSTALLATION OF MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as

specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates of manufacturer furnishing machines and equipment.
- D. Steel Pan Stairs: Provide concrete fill for steel pan stair treads, landings, and associated items. Cast-in inserts and accessories as shown on Drawings. Screed, tamp, and trowel-finish concrete surfaces.
- E. Base Plates and Foundations: Use specified non-shrink, non-metallic grout. Where applicable, grout at least 3 days prior to casting concrete on supported structure.

3.10 CONCRETE PROTECTION AND CURING

- A. General: Comply with ACI 308 "Recommended Practice for Curing Concrete" and ACI 301. Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305.1 for hot-weather protection during curing.
- B. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- C. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including slabs, concrete floor toppings, and other surfaces.
- D. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 - 1. Curing Compound: Apply to all concrete surfaces that are not permanently exposed. Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Provide a second coat applied at 90 degrees to initial application within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
 - 2. Curing and Sealing Compound: Apply to permanently exposed concrete surfaces. Apply uniformly in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.
 - 3. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:

- a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
4. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project

3.11 TOLERANCES

- A. Conform to ACI 117.

3.12 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. If reinforcing steel is exposed, remove concrete to provide a minimum of 3/4" clearance all around. Prior to patching allow the Architect and Threshold Inspector adequate time to review prepared areas. Clean, dampen with water, and brush-coat prepared surfaces with bonding agent or slurry coat. Fill and compact with dry pack grout or non-shrink non-metallic grout before bonding agent has dried. Fill form-tie voids with cement grout, dry pack grout or cone plugs secured in place with bonding agent.
 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.

3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- C. Repairing Unformed Surfaces: Test unformed surfaces, such as slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with dry pack grout or non-shrink non-metallic grout. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- D. Perform structural repairs of concrete, not covered herein, only with Architect's and Structural Engineer's approval, using repair procedures they recommend.
- E. Other repair materials and installation not specified above may be used, subject to Architect's approval.

3.13 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to sample materials, perform tests, and submit test reports during concrete

placement. Sampling and testing for quality control may include those specified in this Article.

- B. Testing Services: Sample concrete after all water and admixtures have been added. Testing of composite samples of fresh concrete obtained according to ASTM C172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain at least one composite sample for each 50 cu. yd. or fraction thereof of each concrete mix placed each day.
 2. Slump: ASTM C143; one test at point of placement for each composite sample. Perform additional tests when concrete consistency appears to change.
 3. Air Content: ASTM C231, pressure method, for normal-weight concrete; ASTM C173, volumetric method, for structural lightweight concrete; one test for each composite sample.
 4. Concrete Temperature: ASTM C1064; one test hourly when air temperature is 40 degrees F and below and when 85 degrees F and above, and one test for each composite sample.
 5. Compression Test Specimens: ASTM C31
 - a. Cast and laboratory cure one set of four standard cylinder specimens for each composite sample. For pumped concrete, take sample at point of placement.
 6. Compressive-Strength Tests of Laboratory Cured Specimens: ASTM C39; test one specimen at 7 days for information and three at 28 days for acceptance. If one of the first two 28-day tests falls below specified strength, test the remaining specimen at 56 days.
 - a. Test two of field cured specimens at 7 days and two specimens at 28 days.
 - b. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
- C. Strength of each concrete mix will be satisfactory if every average of any three consecutive compressive-strength tests (3 sets of 2 cylinders each) equals or exceeds specified compressive strength and no compressive-strength test (1 set of 2 cylinders) value falls below specified compressive strength by 10% or 500 psi, whichever is less.
- D. Strength tests that are not satisfactory indicate questionable concrete. The testing agency and Contractor shall submit to the Architect a report of the questionable concrete plus the two test reports immediately prior to and after (5 reports total) for evaluation.
1. If the questionable concrete is not accepted by the Architect, the testing agency shall take core tests per ACI 301 and ASTM C42 minimum diameter of cores is 4 inches. Concrete will be considered structurally adequate if average of 3 cores is at least 85% f'c and no single core is less than 75% f'c.
 2. Concrete not considered adequate by core testing shall be removed and replaced or load tested per ACI 318, Chapter 20.

- E. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mix proportions and materials, compressive breaking strength, and type of break for each test.
- F. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C42 or by other methods as directed by Architect.
- G. The contractor may be required to pay all costs of additional testing or evaluation of questionable concrete and provide a credit to the Owner for acceptance of questionable concrete.
- H. Correct deficiencies in the Work that test reports and inspections indicate does not comply with the Contract Documents.

3.14 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.
 - 7. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.
- B. Protect concrete surfaces scheduled to receive surface hardener or polished concrete finish using Floor Slab Protective Covering.

END OF SECTION 033000

**SECTION 033543
POLISHED CONCRETE FINISHING**

PART 1 GENERAL

1.01 SUMMARY

- A. Section Includes:
 - 1. Grinding and honing of the slab surface to receive clear reactive, penetrating liquid hardener/densifier to interior concrete.
 - 2. Application of clear reactive, penetrating liquid hardener.
 - 3. Progressively polishing and burnishing of the slab surface to achieve Finish Requirements.
 - 4. Application of stain resistant surface treatment.
- B. Related Requirements:
 - 1. Section 03 30 00- Cast-in-Place Concrete.

1.02 REFERENCES

- A. American National Standard Institute / National Floor Safety Institute
 - 1. ANSI/NSFI B101.1 Test Method for Measuring Wet SCOF of Common Hard-Surface Floor Materials.
- B. ASTM International (ASTM):
 - 1. C1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
 - 2. C1353 - Standard Test Method for Abrasion Resistance of Dimension Stone Subjected to Foot Traffic Using a Rotary Platform, Double-Head Abraser
 - 3. D523- Standard Test Method for Specular Gloss.
 - 4. D1308 - Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
 - 5. D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
 - 6. E96/96M Method B (Water Method) - Standard Test Methods for Water Vapor Transmission of Materials.
 - 7. G154 -Standard Practice for Operating Fluorescent Ultraviolet (UV) Lamp Apparatus for Exposure of Nonmetallic Materials.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Pre-Installation Meeting: Convene before the start of work on new concrete slabs, patching of existing concrete slabs and start of application of concrete finish system.
 - 1. Require attendance of parties directly affecting work of this Section, including the Owner's Representative, Contractor, Architect, concrete installer, and applicator. Meeting should only convene when required parties are present.
 - 2. Review the following:
 - a. Physical requirements of completed concrete slab and slab finish.
 - b. Locations and time of test areas.
 - c. Protection of surfaces not scheduled for finish application.
 - d. Surface preparation.
 - e. Application procedure.
 - f. Quality control.
 - g. Cleaning.
 - h. Protection of finish system.
 - i. Coordination with other work.

1.04 SUBMITTALS

- A. Product Data:

1. Submit manufacturer's product data sheets and tested physical and performance properties on products to be used for the work.
- B. VOC Certification: Submit certification that products furnished comply with regulations controlling use of volatile organic compounds (VOC).
- C. Certificates:
 1. Certificates by manufacturer stating that installer is listed applicator of special concrete finishes, and has completed the necessary training programs.
- D. Floor Protection Plan.
- E. Mock-up:
 1. Install 4' x 4' mock-up panels of each color demonstrating specified concrete color and finish. Mock-up panels shall be independent and may not be integrated into the final project. Keep approved panels available for comparison throughout the project.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications:
 1. Applicator to be familiar with the specified requirements and the methods needed for proper performance of work of this section. Applicator must have availability of proper equipment to perform work within scope of this project on a timely basis. Applicator should have successfully performed a minimum of 5 projects of similar scope and complexity.
 2. Mock-up: On site, prior to the start of the polished concrete finishing process.
 - a. Require attendance of parties directly affecting work of this Section, including the Contractor, Architect, applicator, and Owner's Representative.
 - b. Notify the above parties one week in advance of date and time when mock-up will be completed.
 - c. Demonstrate the materials, equipment and application methods to be used for work specified herein in pre-approved location approximately 50 sq. ft. in area or as directed by [Architect][Owner's Representative].
 - d. Retain approved mock-up during construction as a standard for judging the completed work. Areas may remain as part of the completed work.

1.06 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials in original containers, with seals unbroken, bearing manufacturer labels indicating brand name and directions for storage.
- B. Store concrete hardener/densifier and surface protectant treatment in environment recommended on published manufacturer's product data sheets.
 1. Store containers upright in a cool, dry, well-ventilated place, out of the sun with temperature between 40 and 100 degrees F (4 and 38 degrees C).
 2. Protect from freezing.
 3. Store away from other chemicals and potential sources of contamination.
 4. Keep lights, fire, sparks and heat away from containers.
 5. Do not drop containers or slide across sharp objects.
 6. Do not stack pallets more than three high.
 7. Keep containers tightly closed when not in use.

1.07 FIELD CONDITIONS

- A. Environmental limitations:
 1. Comply with manufacturer's written instructions for substrate temperature and moisture content, ambient temperature and humidity, ventilation, and other conditions affecting performance and finishing requirements.
- B. Close areas to traffic during floor application and after application for time period recommended in writing by manufacturer.

- C. Protect the completed slab to prevent damage by the other trades during floor completion.
- D. Temperature Limitations:
 - 1. Apply when surface and air temperature are between 40 degrees F (4 degrees C) and 95 degrees F (35 degrees C) unless otherwise indicated by manufacturer's written instructions.
 - 2. Apply when surface and air temperatures are expected to remain above 40 degrees F (4 degrees C) for a minimum of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
- E. Apply when air conditions are calm to minimize surface treatment contacting surface not intended to be finished.
- F. Do not apply to frozen substrate. Allow adequate time for substrate to thaw if freezing conditions exist before application.
- G. Apply a minimum of 24 hours after rain event. Suspend application when rain is anticipated for a period of 8 hours after application, unless otherwise indicated by manufacturer's written instructions.
- H. Temporary Heat: Ambient temperature of 50 degrees F (10 degrees C) minimum.
- I. Ventilation: Provide adequate ventilation in confined or enclosed areas in accordance with manufacturer's instructions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Substitutions: Products listed in this section are to be considered the basis of design. Equal products from other manufacturers can be submitted to the architect for evaluation prior to the bid date.

2.02 MATERIALS

- A. Color Additives:
 - 1. Non-stained concrete: natural concrete, no color additives.
- B. Penetrating Concrete Hardener/Densifier: Lithium silicate hardener/densifier.
 - 1. Basis of Design: Consolideck LS, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com.
 - 2. Subject to compliance with the following requirements:
 - a. Comply with national, state and district AIM VOC regulations and contain 50 g/L or less.
 - b. Registered as an approved NSF International/Nonfood Compound Registration.
 - c. Abrasion Resistance: Greater than 50 percent improvement over untreated samples when tested in accordance with ASTM C1353.
 - d. Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1.
 - e. Coefficient of Friction: Greater than 0.60 dry, Greater than 0.60 wet when tested in accordance with ASTM C1028.
 - f. Adhesion: Greater than 10 percent increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.
 - g. Water Vapor Transmission: 100 percent retained when compared to untreated samples when tested in accordance with ASTM E96/96M Method B (Water Method).
 - h. UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.
- C. Interior Concrete Protective Treatments:
 - 1. General Purpose high-gloss film forming premium sealer, lithium silicate hardener/densifier.

- a. Product: Consolideck LSGuard, manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com.
- b. Subject to compliance with the following requirements:
 - 1) Comply with national, state and district AIM VOC regulations.
 - 2) Registered as an approved NSF International/Nonfood Compound Registration.
 - 3) Achieve 'High Traction Range' readings when tested in accordance with ANSI B101.1.
 - 4) Coefficient of Friction: Greater than 0.60 dry, greater than 0.60 wet when tested in accordance with ASTM C1028.
 - 5) Adhesion: : Greater than 10 percent increase in pull-off strength when compared to an untreated sample when tested in accordance with ASTM D4541.
 - 6) UV Stability: No degradation or yellowing of material when tested in accordance with ASTM G154.

2.03 EQUIPMENT

- A. Auto Scrubber Machine: For cleaning operations.
- B. Hand Grinder or stand-up edger for edge grinding/polishing.
- C. Grinding/Polishing Equipment:
 - 1. Dry grinding/polishing machines shall include a dust extraction system, including HEPA filtration vacuum.
- D. Diamond Segments:
 - 1. Use heads from the same manufacturers throughout the entirety of the project.
- E. Diamond Heads Types:
 - 1. Metal Diamonds: 80 or 150.
 - 2. Hybrid Style Diamonds: 50 or 100.
 - 3. Resin Bonded, Phenolic Diamonds: 100, 200, 400, 800, 1500, and 3000 (if necessary).
- F. Burnishing Machine and Burnishing Pads to produce specified results.
 - 1. Burnishing Machine: High speed burnisher, generating pad speeds of 1,500 RPM or higher, as recommended by protective treatment manufacturer. Dust skirt must be installed at time of work.
 - 2. Burnishing Pads: as recommended by protective treatment manufacturer.
 - a. White Burnishing Pad, non-abrasive.
 - b. Consolideck Heat Pad manufactured by PROSOCO, Inc., Lawrence, KS, (800) 255-4255, www.prosoco.com.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine substrate with installer present for conditions affecting performance of finish. Correct conditions detrimental to timely and proper work. Notify the Architect in writing of conditions detrimental to the proper and timely completion of the work.
- B. Do not begin installation until all unsatisfactory conditions are resolved. Beginning work constitutes acceptance of site conditions and responsibility for defective installation caused by prior observable conditions.

3.02 PREPARATION

- A. Cure time: concrete slabs scheduled for polished concrete finish shall be watered to maintain maximum moisture content for 7 days after initial concrete pour.
- B. Application: concrete polishing shall be completed prior to partition placement.
- C. Take all necessary precautions to protect adjacent spaces on the same floor and below from any negative effects that may result from concrete grinding, honing, or finishing process.

- D. Clean dirt, dust, oil, grease and other contaminants that interfere with penetration or performance of specified product from surfaces. Use appropriate concrete cleaners approved by the concrete surface treatment manufacturer where necessary. Rinse thoroughly using pressure water spray to remove cleaner residues. Allow surfaces to dry completely before application of product.
- E. Repair, patch and fill cracks, voids, defects and damaged areas in surface as approved by the Architect. Allow repair materials to cure completely before application of product.
- F. All holes in concrete floor in areas to receive polished concrete floor finish to be patched be filled by polished concrete subcontractor to provide for correct patch material to result in uniform color and finish.
- G. Variations in substrate texture and color will affect final appearance and should be corrected prior to application of sealer/hardener system and the polishing steps.
- H. Protect surrounding areas prior to application. If product is accidentally misapplied to adjacent surfaces, flush with water immediately before material dries.
- I. Avoid contact in areas not to be treated. Avoid contact with metal, glass and painted surfaces.
- J. Seal open joints in accordance with Section 07 90 00.
- K. Apply specified sealants and caulking and allow complete curing before application of penetrating concrete hardener/densifier.
- L. Do not proceed until unsatisfactory conditions have been corrected.

3.03 CONCRETE GRINDING, HONING, AND POLISHING

- A. Adhere to industry standard grinding, honing, and polishing procedures for dry and wet grinding and honing.
- B. Scrub and rinse slab surface with clean water and vacuum with auto-scrubber between and after final passes.
- C. Sequential progression of diamond tooling steps shall be required and limited to no more than double the grit value of the previous diamonds used.
- D. Overlap adjacent passes by 25 percent.
- E. Perform each pass perpendicular to the other pass north/south then east/west; multiple passes may be needed.
- F. Progressively grind, hone and polish the slab surface utilizing approved diamond segments as necessary to produce Finishing requirements.
 - 1. Apply liquid concrete repair material to fill gaps, voids and pop-outs during grinding operation per manufacturer's published recommendations.

3.04 APPLICATION OF PENETRATING CONCRETE HARDENER/DENSIFIER

- A. Apply hardener/densifier at the rate of 500 to 700 square feet per gallon with a low pressure sprayer fitted with a 0.5 gpm spray tip. (Typically after 200-grit and no later than 400 grit).
- B. Apply sufficient material to keep concrete surface wet for 5 to 10 minute period, without producing puddles.
- C. Allow treated surface to dry.
- D. Continue progressively polishing floor with required resin diamonds as necessary to produce desired final finish.

3.05 APPLICATION OF INTERIOR CONCRETE PROTECTIVE TREATMENT

- A. Application of general purpose, high gloss protective treatment:
 - 1. Apply per manufacturer's published recommendations to clean, dry slab at the completion of mechanically polishing the slab surface.

2. Lightly wet a clean microfiber pad with protective treatment and wring out excess, leaving the pad damp.
3. Working from one control joint to another, apply a light, fine spray of protective treatment to a small section of the floor using a clean, pump-up sprayer fitted with a 0.5 gpm spray tip, at an estimated coverage rate of 2000 to 3000 square feet per gallon.
4. Using the damp microfiber pad and firm downward pressure, immediately spread the protective treatment to produce a thin, even coating. Spread the product as far as possible while maintaining a wet edge. Properly applied, protective treatment dries quickly. Stop spreading once drying begins. Avoid overlapping.
5. Allow to dry tack free, typically 20 to 60 minutes.
6. Once dry, high- speed burnish slab surface fitted with manufacturer recommended burnishing pad to increase gloss and to help the treatment fuse and bond with the concrete for increased durability and longevity. Surface temperatures immediately behind the burnisher must achieve 90.5 degrees Fahrenheit. (Burnish between coats if multiple applications are desired.)
7. Repeat above steps 1 through 6, as necessary for additional applications of protective treatment, to achieve desired final finish (Maximum 3 coats).
8. Retain paragraph below if a general purpose, medium gloss protective treatment is required.

3.06 SLAB PROTECTION

- A. Protect finished floors to prevent damage including staining, gouges and scratching by construction traffic and activities until possession.
- B. Do not drag or drop equipment or material across the slab which will scratch or chip it.
- C. Inspect tires for debris prior to use on slab. Remove embedded items which may cause damage to floor slab.
- D. Clean up spills on slab immediately. Provide cleaning chemicals and absorptive materials.
- E. Develop a concrete protection procedure which addresses the following procedures:
 1. Communication of protection plan to subcontractors and vendors.
 2. Procedures for cleaning up slab spills, including use of and availability of cleaning chemicals and absorptive materials at Site.
- F. Provide a clean slab surface using concrete maintenance cleaner within an auto scrubber, equipped with soft nylon brushes, in accordance with manufacturer's published recommendations.

3.07 FINISHING REQUIREMENTS

- A. Appearance:
 1. Interior exposed finished slab areas must consist of the following:
 - a. Slab surface must meet the desired sheen, as discussed in Pre-Installation meeting and be consistent with approved Mock-up.
 - b. Slab surface must have a consistent look and exhibit a finish that has no evidence of streaking or burnish marks.
 - c. White residue or hazy appearance is not acceptable.
 - d. Exposure of aggregate beyond CPAA B-Fine Aggregate is not acceptable.
 - e. Interior exposed finished slab areas must consist of the following CPAA Gloss Level:
 - 1) Finished Gloss Level 3 - Semi-Polished Gloss Appearance.

END OF SECTION 033543

**SECTION 042723
CAVITY WALL UNIT MASONRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Clay facing brick.
- B. Mortar and grout.
- C. Reinforcement and anchorage.
- D. Flashings.
- E. Lintels.
- F. Accessories.

1.02 RELATED REQUIREMENTS

- A. Section 042200 - Reinforced Masonry
- B. Section 047200 - Cast Stone Masonry
- C. Section 079200 - Joint Sealants: Sealing control and expansion joints.

1.03 REFERENCE STANDARDS

- A. ASTM A1 - Standard Specification for Carbon Steel Tee Rails; 2000 (Reapproved 2010).
- B. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures; 2016.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- D. ASTM A1064/A1064M - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete; 2018a.
- E. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar; 2018.
- F. ASTM C150/C150M - Standard Specification for Portland Cement; 2015.
- G. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes; 2006 (Reapproved 2011).
- H. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale); 2014.
- I. ASTM C270 - Standard Specification for Mortar for Unit Masonry; 2019.
- J. ASTM C404 - Standard Specification for Aggregates for Masonry Grout; 2011.
- K. ASTM C476 - Standard Specification for Grout for Masonry; 2020.
- L. ASTM C979/C979M - Standard Specification for Pigments for Integrally Colored Concrete; 2010.
- M. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing; 2017.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units, fabricated wire reinforcement, and mortar.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum ten years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

1.06 MOCK-UPS

- A. Construct a masonry cavity wall as a mock-up panel sized 8 feet long by 8 feet high; include mortar and accessories, reinforcement, flashings, and wall insulation in mock-up.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

1.08 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

PART 2 PRODUCTS

2.01 BRICK UNITS

- A. Manufacturers:
 - 1. Basis of design: Cherokee Brick & Tile Co.
- B. Facing Brick: ASTM C216, Type FBS, Grade SW.
 - 1. Basis of design brick color A: Cherokee Flash, smooth texture.
 - 2. Basis of design brick color B: Cherokee Velour Buff, smooth texture.
 - 3. Nominal Size: modular.
 - 4. Special Shapes: Molded units as required by conditions indicated, unless standard units can be sawn to produce equivalent effect.

2.02 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, Type I; color as required to produce approved color sample.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Mortar Aggregate: ASTM C144.
- D. Grout Aggregate: ASTM C404.
- E. Pigments for Colored Mortar: Pure, concentrated mineral pigments specifically intended for mixing into mortar and complying with ASTM C979/C979M.
 - 1. Color(s): To match Architect's sample(s) when incorporated into specified mix design(s).
- F. Water: Clean and potable.

2.03 REINFORCEMENT AND ANCHORAGE

- A. Manufacturers:
 - 1. Blok-Lok Limited; _____: www.blok-lok.com/#sle.
 - 2. Hohmann & Barnard, Inc; _____: www.h-b.com/#sle.
- B. Adjustable Multiple Wythe Joint Reinforcement: Truss type with adjustable ties or tabs spaced at 16 in on center, and fabricated with moisture drip; ASTM A1064/A1064M steel wire, hot dip galvanized after fabrication to 16 CFR 1201 Class B; 0.1875 inch side rods with 0.1483 inch cross rods and adjustable components of 0.1875 inch wire; width of components as required to provide not more than 1 inch and not less than 1/2 inch of mortar coverage from each masonry face.
 - 1. Vertical adjustment: Not less than 2 inches.

2.04 FLASHINGS

- A. Copper/Rubberized Asphalt Flashing: 5 oz/sq ft copper sheet coated with elastic asphalt compound.
- B. Single-Wythe CMU Flashing System: System of CMU cell flashing pans and interlocking CMU web covers made from high-density polyethylene incorporating chemical stabilizers that prevent UV degradation. Cell flashing pans have integral weep spouts that are designed to be built into mortar bed joints and weep collected moisture to the exterior of CMU walls and that extend into the cell to prevent clogging with mortar.

1. Product: Subject to compliance with requirements, provide "Blok-Flash" by Advanced Building Products Inc.
- C. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane, or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.

2.05 ACCESSORIES

- A. Preformed Control Joints: Neoprene material. Provide with corner and tee accessories, fused joints.
- B. Nailing Strips: Softwood lumber, preservative treated for moisture resistance, dovetail shape, sized to masonry joints.
- C. Termination Bars: Stainless steel; compatible with membrane and adhesives.
- D. Drip Edge: Stainless steel; compatible with membrane and adhesives.
- E. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.
- F. Cavity Vents:
 1. Type: Extruded propylene with honeycomb design.
 2. Manufacturers:
 - a. Blok-Lok Limited; _____: www.blok-lok.com/#sle.
 - b. CavClear/Archovations, Inc: www.cavclear.com/#sle.
 - c. Hohmann & Barnard, Inc; _____: www.h-b.com/#sle.
 - d. Mortar Net USA, Ltd; _____: www.mortarnet.com/#sle.
 - e. Substitutions: See Section 016000 - Product Requirements.
- G. Cavity Mortar Control: Semirigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
 1. Strips, full-depth of cavity and 10 inches (250 mm) high, with dovetail shaped notches 7 inches (175 mm) deep that prevent clogging with mortar droppings.
 2. Mortar Diverter: Panels designed for installation at flashing locations.
- H. Cleaning Solution: Nonacidic, not harmful to masonry work or adjacent materials.

2.06 MORTAR AND GROUT MIXING

- A. Mortar for Unit Masonry: ASTM C270, using the Proportion Specification.
 1. Masonry below grade and in contact with earth; Type S.
 2. Exterior, non-loadbearing masonry; Type N.
 3. Interior, loadbearing masonry; Type N.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.
- C. Grout: ASTM C476; consistency required to fill indicated volumes completely for grouting; fine grout for spaces with smallest horizontal dimension of 2 inches or less; coarse grout for spaces with smallest horizontal dimension greater than 2 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

3.02 PREPARATION

- A. Direct and coordinate placement of metal anchors supplied for installation under other sections.

- B. Provide temporary bracing during installation of masonry work. Maintain in place until building structure provides permanent bracing.

3.03 COURSING

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Concrete Masonry Units:
 - 1. Bond: Running.
 - 2. Coursing: One unit and one mortar joint to equal 8 inches.
 - 3. Mortar Joints: Concave.
- D. Brick Units:
 - 1. Bond: As indicated for different locations.
 - 2. Coursing: Three units and three mortar joints to equal 8 inches.
 - 3. Mortar Joints: Concave.

3.04 PLACING AND BONDING

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- C. Remove excess mortar as work progresses.
- D. Interlock intersections and external corners, except for units laid in stack bond.
- E. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- F. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.
- G. Cut mortar joints flush where wall tile is scheduled or resilient base is scheduled.
- H. Isolate masonry partitions from vertical structural framing members with a control joint.
- I. Isolate top joint of masonry partitions from horizontal structural framing members and slabs or decks with compressible joint filler.

3.05 WEEPS/CAVITY VENTS

- A. Install cavity vents in cavity walls at 32 inches on center horizontally below shelf angles and lintels and at top of walls.

3.06 CAVITY WALL CONSTRUCTION

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. Install cavity mortar diverter at base of cavity as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.
- C. Build inner wythe ahead of outer wythe to receive accessories.

3.07 REINFORCEMENT AND ANCHORAGES - CAVITY WALL MASONRY

- A. Install horizontal joint reinforcement 16 inches on center.
- B. Place masonry joint reinforcement in first and second horizontal joints above and below openings. Extend minimum 16 inches each side of openings.
- C. Embed longitudinal wires of joint reinforcement in mortar joint with at least 5/8 inch mortar cover on each side.
- D. Lap joint reinforcement ends minimum 6 inches.
- E. Reinforce stack bonded unit joint corners and intersections with strap anchors 16 inches on center.

3.08 MASONRY FLASHINGS

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
 - 1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up at least 1 inch, minimum, to form watertight pan at non-masonry construction.
 - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
 - 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Terminate flashing up 8 inches minimum on vertical surface of backing:
 - 1. Install vertical leg of flashing over fluid-applied or self-adhered air/vapor barriers over backing or per manufacturer's directions.
 - 2. Terminate vertical leg of flashing into bed joint in masonry or reglet in concrete.
- C. Install flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7.
- D. Extend metal flashings to within 1/4 inch of exterior face of masonry.

3.09 LINTELS

- A. Install loose steel lintels over openings. Provide minimum bearing of 8" at each jamb, unless otherwise indicated.

3.10 CONTROL AND EXPANSION JOINTS

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joints as indicated on drawings; if not indicated, 3/4 inch wide and deep.
- D. Form expansion joint as detailed on drawings.

3.11 BUILT-IN WORK

- A. As work progresses, install built-in metal door frames and other items to be built into the work and furnished under other sections.
- B. Install built-in items plumb, level, and true to line.
- C. Bed anchors of metal door and glazed frames in adjacent mortar joints. Fill frame voids solid with grout.
 - 1. Fill adjacent masonry cores with grout minimum 12 inches from framed openings.

3.12 TOLERANCES

- A. Maximum Variation from Alignment of Columns: 1/4 inch.
- B. Maximum Variation From Unit to Adjacent Unit: 1/16 inch.
- C. Maximum Variation from Plane of Wall: 1/4 inch in 10 ft and 1/2 inch in 20 ft or more.
- D. Maximum Variation from Plumb: 1/4 inch per story non-cumulative; 1/2 inch in two stories or more.
- E. Maximum Variation from Level Coursing: 1/8 inch in 3 ft and 1/4 inch in 10 ft; 1/2 inch in 30 ft.
- F. Maximum Variation of Joint Thickness: 1/8 inch in 3 ft.
- G. Maximum Variation from Cross Sectional Thickness of Walls: 1/4 inch.

3.13 CUTTING AND FITTING

- A. Cut and fit for chases. Coordinate with other sections of work to provide correct size, shape, and location.
- B. Obtain approval prior to cutting or fitting masonry work not indicated or where appearance or strength of masonry work may be impaired.

3.14 CLEANING

- A. Remove excess mortar and mortar smears as work progresses.
- B. Replace defective mortar. Match adjacent work.
- C. Clean soiled surfaces with cleaning solution.

3.15 PROTECTION

- A. Without damaging completed work, provide protective boards at exposed external corners that are subject to damage by construction activities.

END OF SECTION 042723

SECTION 042900 - REINFORCED UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes grouted, reinforced masonry consisting of grout and reinforcing steel.
- B. Related Sections:
 - 1. Section 032000 "Concrete Reinforcement" for reinforcing steel.
 - 2. Section 033000 "Cast-In-Place Concrete" for concrete.
 - 3. Section 042000 "Unit Masonry" for all other elements of masonry construction.

1.3 DEFINITIONS

- A. CMU(s): Concrete masonry unit(s).
- B. Reinforced Unit Masonry: Masonry containing reinforcing steel in grouted cells.

1.4 PERFORMANCE AND PRECONSTRUCTION TESTING REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28-days. Contractor shall determine the net-area compressive strength of masonry based on 1.4B or 1.4C. Mortar for unit masonry shall comply with ASTM C270. Contractor shall meet ASTM C270 requirements based on the Property or Performance Specification.
- B. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
 - 1. Preconstruction Testing Service: Contractor will engage a qualified independent testing agency to perform preconstruction testing indicated below. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

- a. Concrete Masonry Unit Test (Property and Proportion Specification): For each type of unit required, according to ASTM C140 for compressive strength.
- b. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C780.
- c. Mortar Test (Property Specification): For each mix required, according to ASTM C109 for compressive strength.
- d. Mortar Test (Property Specification): For each mix required, according to ASTM C780 for compressive strength.
- e. Grout Test (Compressive Strength) (Property and Performance Specification): For each mix required, according to ASTM C1019.

1.5 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 013100 "Project Management and Coordination."

1.6 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
 2. Reinforcing Steel: Show fabrication and installation details Reinforcing Steel. Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show bar sizes, schedules, bent bar diagrams and other arrangements as required for fabrication and placement. **Shop drawings shall have elevations of reinforced walls including all control joints and wall openings coordinated with architectural and mechanical documents.**
- C. Material Test Reports: From a qualified testing agency indicating and interpreting test results of the following for compliance with requirements indicated:
 1. Grout mixes complying with material and compressive strength requirements of ASTM C476 for fine grout. Include description of type and proportions of grout ingredients and design slump.

1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For testing agency
- B. Material Certificates: For each type and size of the following:
 1. Masonry units.

- a. Include material test reports substantiating compliance with requirements
 - b. Include data and calculations establishing average net-area compressive strength of units.
2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 1. Test according to ASTM C109 for compressive strength, ASTM C1506 for water retention, and ASTM C91 for air content.
 2. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirements.
- D. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.
- E. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.8 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C1093 for testing indicated.
- B. Masonry Standard: Comply with the Florida Building Code, 8th Edition and ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.10 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least 3 days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Refer to Section 042000 "Unit Masonry" for masonry materials and accessories and grout materials not included in this section.

2.2 MANUFACTURERS

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges, accepted for these characteristics, from single source manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

2.3 CONCRETE MASONRY UNITS

- A. CMUs: ASTM C90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2,000 psi.
 - 2. Density Classification: Normal weight.
- B. Shapes: Provide shapes indicated and as follows, with exposed surfaces, matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for corners, jambs, sashes, control joints, lintels, bond beams and other special conditions.

2.4 CONCRETE AND MASONRY LINTELS

- A. General: Provide one of the following:
 - 1. Provide precast lintels made from concrete matching concrete masonry units in color, texture, and compressive strength and with reinforcing bars indicated or required to support loads indicated. Cure precast lintels by the same method used for concrete masonry units.
 - 2. Provide prefabricated or built-in-place masonry lintels. Use specially formed bond beam units with reinforcing bars placed as indicated and filled with fine grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

2.5 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

- D. Mortar Cement: ASTM C1329.
- E. Aggregate for Mortar: ASTM C144
- F. Aggregate for Grout: ASTM C404 for fine grout.
- G. Water: Potable.

2.6 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615, Grade 60. Shop fabricate bent bars.
- B. Masonry Joint Reinforcement, General: ASTM A 951.
 - 1. Interior Walls: Mill- galvanized, carbon steel.
 - 2. Exterior Walls: Hot-dip galvanized, carbon, ASTM A 153 with a coating thickness of 1.50 oz/sf steel.
 - 3. Wire Size for Side Rods: 0.148-inch diameter.
 - 4. Wire Size for Cross Rods: 0.148-inch diameter.
 - 5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches o.c.
 - 6. Provide in lengths of not less than 10 feet, with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods complying with ASTM A951.
- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells with loops for holding reinforcing bars in center of cells. Units are formed from 0.148-inch steel wire, hot-dip galvanized after fabrication.
 - 1. Provide units with either two loops or four loops as needed for number of bars indicated.

2.7 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site
- C. Mortar for Unit Masonry: Comply with ASTM C270 Proportion or Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.

1. For masonry retaining earth, use Type M.
 2. For all other masonry, use Type S.
- D. Grout for Unit Masonry: Comply with ASTM C476 with a minimum compressive strength of 3000 psi in 28 days.
1. Use fine grout with a slump of 8 to 10 inches as measured according to ASTM C143.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. Verify that foundations are within tolerances specified.
 2. Verify that reinforcing dowels are properly placed.
 3. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Refer to Section 042000 "Unit Masonry" for general installation requirements of unit masonry.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to the opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, Cut masonry units with motor-driven saws to provide clean, sharp, unchipped edges. Cut units which are not in multiples of 8 inches. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Allow wet masonry units to dry prior to placement.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch or minus 1/4 inch.

2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch in a story height or 1/2 inch total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet, 1/4 inch in 20 feet, or 1/2-inch maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet, 3/8 inch in 20 feet, or 1/2-inch maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2-inch maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch, with a maximum thickness limited to 1/2 inch.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch.
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch or minus 1/4 inch.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, reinforcement, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern: Unless otherwise indicated, lay masonry in one-half running bond with vertical joint in each course centered on units in courses above and below, unless otherwise indicated on Drawings. Interlock each course at corners.
- C. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

- D. Place clean units while the mortar is soft and plastic. Remove and relay in fresh mortar any unit disturbed to the extent that initial bond is broken after initial positioning.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- G. Fill cores in hollow concrete masonry units with grout 24 inches under bearing plates, beams, lintels, posts, and similar items, unless otherwise indicated.
- H. Design, provide and install bracing that will assure stability of masonry during construction. Include provisions to project against wind or other natural or construction forces that might collapse or otherwise damage a partially or completely built masonry wall in a partially completed structure.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow masonry units as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.
 - 3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
 - 4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.

3.6 MASONRY JOINT REINFORCEMENT

- A. General: Provide continuous masonry joint reinforcement as indicated. Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 16 inches o.c.
 - 2. Space reinforcement not more than 8 inches o.c. in foundation walls.
 - 3. Provide reinforcement not more than 8 inches above and below wall openings and extending 12 inches beyond openings in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at corners and wall intersections by using prefabricated "L" and "T" sections.

- D. Cut and bend reinforcing units as directed by manufacturer for continuity at returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
 - 1. Provide an open space not less than 1/2 inch wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors as indicated, but not more than 16 inches o.c. or as indicated on the drawings.

3.8 ANCHORING MASONRY TO CONCRETE

- A. Anchor masonry to concrete where masonry abuts or faces concrete to comply with the following:
 - 1. Provide an open space not less than 1/2 inch wide between masonry and concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
 - 2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
 - 3. Space anchors at 16 inches o.c. vertically and 36 inches.

3.9 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry as follows:
 - 1. Install backer-rod in head joints and apply sealant after concrete masonry is complete.

3.10 LINTELS

- A. Provide concrete or masonry lintels where shown and where openings of more than 24 inches are shown. Reinforce and grout lintels as shown on the Drawings.
- B. Install steel lintels where indicated.

- C. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.

3.11 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores to support reinforced masonry elements during construction.
 - 1. Construct formwork to conform to shape, line, and dimensions shown. Make it sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other temporary loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements of ACI 530.1/ASCE 6/TMS 602 and as follows:
 - 1. Place reinforcement and accessories as indicated.
 - 2. Support and fasten reinforcement together to prevent displacement by construction loads or by placement of grout.
 - 3. Clean reinforcement by removing mud, oil, or other materials that will reduce the bond at the time grout is placed. Reinforcement with tightly bound rust and/or mill scale is acceptable without cleaning provided the dimensions and weights, including heights of deformations, of the cleaned sample are not reduced.
 - 4. Place all reinforcement prior to grouting. Tie vertical reinforcement to dowels at base of masonry with tie wire and thread masonry units over or around reinforcement. Support vertical reinforcement at 10 feet o.c. Extend vertical bars the specified lap length above top of pour and support bar in proper position at top of grout pour. Where vertical bars are placed after laying masonry, place wire loops extending into cells as masonry is laid and loosen before mortar sets. After insertion of bar, pull loops and bar to proper position and tie free ends.
 - 5. Do not bend reinforcement after it is embedded in grout.
 - 6. Splice bars only where indicated. Provide 48 bar diameter lap splices, unless otherwise noted. Place bars in contact and wire tie. Bars spliced by noncontact lap splices shall be spaced 6 inches apart (maximum).
 - 7. Bar placement tolerance is $\pm 1/2$ inches perpendicular to wall and 2 inches along wall. The clear distance between parallel bars that are not contact lap spliced shall be not less than 1 inch in walls and 1-1/2 inches in columns and pilasters. Maintain $1/4$ inch clear between bars and any face of masonry.
- C. Laying Masonry Walls: Construct masonry walls as follows:
 - 1. Lay masonry units to top of grout pour prior to placing grout. Maximum grout pour height is 12 feet or top of bond beam, whichever is lower.
 - 2. Construct wall such that vertical cells to be grouted are aligned and unobstructed openings for grout are 3 inches x 4 inches (minimum). Construct grout spaces free of mortar droppings, debris, loose aggregates, and any material deleterious

- to grout; or, clean the cells prior to grouting. Remove masonry protrusions extending 1/2 inch or more into cells to be grouted.
3. Do not lay masonry until grouted masonry below is cured.
 4. In bond beams, use special units or modify regular units to allow placement of horizontal bars. Place small mesh, expanded metal lath or wire screening in mortar joints under bond beam courses over cells of non-reinforced vertical cells.
- D. Cleanouts: Provide cleanout openings at each vertical bar at the base of walls in which one of the following applies:
1. Grout pour height exceeds 5 feet.
 2. Vertical bars are not otherwise fastened to prevent displacement. In this case, use cleanout to securely tie bar in position.
 3. To remove dust, dirt, mortar droppings, loose pieces of masonry and other foreign materials from cell and top of support in cells to be grouted.
- Construct cleanout by cutting opening in face shell. Construct cleanouts with openings of sufficient size to permit removal of debris and tying of bars. Minimum size is 3 inches x 3 inches. After cleaning and inspection, close cleanout opening and brace closure to resist grout pressure.
- E. Grouting: Do not place grout until entire height of masonry to be grouted has attained sufficient strength to resist grout pressure.
1. Comply with requirements of ACI 530.1/ASCE 6/TMS 602.
 2. Place grout within 1 1/2 hours from introducing water in the mixture and prior to initial set.
 3. Confine grout to the areas indicated.
 4. Place grout by pumping into grout spaces unless alternate methods are acceptable to the Architect.
 5. Place grout continuously in lintels and bond beams. Grout walls in lifts not exceeding 5 feet or the elevation of top of bond beam, whichever is lower.
 6. If grout pour during one day exceeds 5 feet, grout in lifts 5 feet each or less, with not less than 30 minutes and not more than 1 hour between lifts.
 7. Terminate grout 1-1/2 inches below bond beam course or where cell above is to be grouted.
 8. Place grout in bond beam course before filling vertical cores above bond beam.
 9. Consolidate grout with mechanical vibrators having a 3/4 inch diameter head. Vibrate each lift and reconsolidate after 10 minutes. Grout pours 12 inches high or less may be puddled in lieu of mechanical vibration.

3.12 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a Testing Agency to perform tests and prepare reports. Allow access to scaffolding and work areas, as needed to perform tests. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.

1. Begin masonry construction only after the Testing Agency has verified proportions of site-prepared mortar.
- B. Testing Frequency: Four grout cubes will be sampled and tested for compressive strength per ASTM C1019 for each 5000 sq. ft. of wall surface.

3.13 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained or otherwise damaged or that do not match the adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 2. Remove all mortar fins larger than 1/2 inch within cells to be reinforced.

END OF SECTION 042900

This page intentionally left blank

SECTION 051200 - STRUCTURAL STEEL

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. The work specified in this section includes all labor, materials, equipment, permits, and services necessary for the furnishing, fabrication and erection of structural steel and related work, complete, in accordance with the Drawings and as specified herein, including the detailing of all connections.
- B. Structural steel is that work defined in AISC "Code of Standard Practice for Steel Buildings and Bridges" and as otherwise shown on Drawings.
- C. Related Requirements:
 - 1. Section 031000 "Concrete Formwork" for Placing Anchor Rods.
 - 2. Section 033000 "Cast-In-Place Concrete" for Grouting Base Plates.
 - 3. Section 052100 "Steel Joists."
 - 4. Section 053100 "Steel Deck."
 - 5. Section 055000 "Metal Fabrication."
 - 6. Section 078100 "Applied Fireproofing."
 - 7. Section 099113 "Exterior Painting" and Section 099123 "Interior Painting" and Section 099600 "High Performance Coatings."

1.3 DEFINITIONS

- A. Structural Steel: Elements of the structural frame indicated on Drawings and as described in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- B. Heavy Sections: Rolled and built-up sections as follows:
 - 1. Shapes included in ASTM A6 with flanges thicker than 1-1/2 inches.
 - 2. Welded built-up members with plates thicker than 2 inches.
 - 3. Column base plates thicker than 2 inches.

1.4 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

1.5 RESPONSIBILITIES

- A. The Engineer of Record is responsible for the design of the steel framing and the connections that are fully detailed as presented in the Contract Documents.
- B. The fabricator is responsible for the preparation of Shop and Erection Drawings pursuant to the requirements of the Contract Documents. All connections that are not completely detailed on the drawings shall be designed by the Fabricator's Delegated Engineer. Submit signed and sealed connection details and calculations to the EOR for approval prior to submitting shop drawings. Once approved, the connection details may be incorporated in the shop drawings. The shop drawings are not required to be signed and sealed.
- C. The fabricator is responsible for the coordination of all surveyed field conditions and field measurements necessary for the detailing, fabrication and erection of their work. All field measurements shall be provided on the shop drawings prior to submittal.
- D. The Engineer of Record is responsible for the structural adequacy of the structure in the completed project. The erector is responsible for the means, methods and safety of the erection, including all temporary guys, beams, falsework, cribbing or other elements required for the erection operation. If the erector is unsure of these requirements, he shall retain a Florida Licensed Engineer to determine and design all temporary requirements.

1.6 PREINSTALLATION MEETINGS

- A. Preconstruction Meeting: There shall be a Preconstruction Meeting with the Owner, Architect, Structural Engineer, Contractor, Fabricator, Erector, Testing Laboratory and Special Inspector to clarify responsibilities and requirements as set forth in Division 01 "Project Management and Coordination".

1.7 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings:
 - 1. Submit to the Architect for acceptance, shop and erection drawings for all structural steel components. See "Shop Drawings and Other Submittals" notes

regarding the possible reproduction of Structural Drawings for use as shop or erection drawings. Drawings shall include complete details, dimensions, schedules and procedures for the fabrication, assembly, and sequence of erection.

2. No changes to the completed connection shown on the drawings will be considered without complying with the applicable requirements for substitutions. The fabricator shall submit details and complete calculations that clearly identify proposed substitutions for Engineer's review prior to preparation of detailed shop drawings. Proposed variations to details shown on the Contract Drawings will be considered and such variations must have preliminary acceptance prior to the preparation of detailed shop drawings. The details and calculations shall clearly show the capacity of the connections designed by the fabricator. The calculations shall show details of the assembled joint with all bolts and welds required. All design calculations, drawings and details for substitutions shall be signed, sealed and dated by the Delegated Engineer.
3. For structural steel connections indicated on the drawings to comply with design loads, include signed and sealed calculations by the qualified professional engineer responsible for their preparation under the following criteria:
 - a. Design all connections for the factored forces indicated on the drawings in accordance with all applicable codes and specifications.
 - b. Set connection work point at the intersection of member centerlines for all connection design and detailing.
 - c. The conceptual connections on the drawings show design intent and shall be completed for the member designated forces. Adapt those details to accommodate the atypical conditions. The conceptual connection does not show the complexity of the final connection designed for the required forces.
 - d. Design, detail, and install stiffeners, continuity plates, doubler plates as required to resist the indicated design forces. The member size is based on member behavior away from the connection.
 - e. All forces shown on the drawings act concurrently unless noted otherwise.
 - f. During bidding, if no moment is shown on the drawings, provide full moment capacity of the member of $.9 F_y Z$; and if no shear is shown, provide full shear capacity of $.6 F_y d_{tw}$. For missing tension forces, assume 95% of the tension member capacity.
 - g. Use the same bolt sizes shown on the drawings. All bolts with the same diameter shall be of the same grade. Skip one diameter size for bolts with different grades. Do not use oversized or slotted holes unless approved by EOR.
 - h. Shop drawings incorporating the design of the Delegated Engineer shall be reviewed and stamped by the Delegated Engineer prior to submittal to the EOR.
4. Include details of cuts, connections, camber, holes, threaded fasteners and other pertinent data. Indicate welds by standard AWS A2.4 symbols and show size, length, and type of each weld. Show shop welds on shop drawings and field welds on erection drawings.
5. Provide setting drawings, templates, and directions for installation of anchor rods, embeds and other anchorages to be installed by others.
6. Indicate surface preparation, such as primed, galvanized, etc., of each surface of each piece.

- C. Acceptance of the Shop and Erection Drawings by the Architect/Engineer does not relieve the Fabricator of the responsibility for accuracy of detail dimensions on the shop drawings and the general fit-up of parts to be assembled in the field.
- D. Before welding is started, the steel fabricator and erector, as applicable, shall submit to the Architect a signed and sealed statement by a Florida Licensed Engineer, who specializes in the design of weldments, that he/she has provided written welding procedures for this Project, establishing the welding process, sequence of assembly, preheat, interpass and postheat requirements in general if high residual stresses are present, and in particular for all members requiring partial or complete penetration groove welding.

1.8 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Include lists of Qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Welding certificates. Submit to Owner's inspection agency.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill Test Reports: Fabricator's certification that the chemical and physical properties of the following materials comply with the Project requirements:
 - 1. Structural steel
 - 2. Bolts, nuts and washers.
 - 3. Direct-tension indicators.
 - 4. Shear studs.
 - 5. Welding electrodes.
- E. Product Test Reports: For the following:
 - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
 - 2. Direct-tension indicators.
 - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
 - 4. Shear stud connectors.
 - 5. Shop primers.
 - 6. Nonshrink grout.
- F. Product Data for each type of product specified, including the following:
 - 1. Bolts, nuts, and washers, including mechanical properties.
 - 2. Direct-tension indicators.
 - 3. Shear stud connectors.
 - 4. Structural steel coatings.
- G. Fabricator's Quality Control Program.

1. Include welding and testing procedures.
- H. Fabricator's shop inspection and test reports.
- I. Substantiating data for primer on Class A faying surface.

1.9 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator with a minimum five years of documented successful experience on equivalent projects. Submit résumé demonstrating equivalent project experience.
- B. Installer Qualifications: A qualified installer with a minimum five years of documented successful experience on equivalent projects. Submit copy of AISC Certification and résumé demonstrating equivalent project experience.
- C. Qualifications for welding work: Qualify welding procedures and operators in accordance with AWS "Standard Qualification Procedure".
 1. The Fabricator for shop welds and the Erector for field welds shall retain a Florida Licensed Engineer, who specializes in the design of weldments to prepare a written welding program pursuant to the requirements of AWS D1.1. The program shall include all necessary Welding Procedure Specifications (WPS), all necessary requirements for qualification testing of WPS and welding personnel. The WPS shall include the welding process, sequence of assembly, preheat, interpass and postheat requirements. Welded joints of heavy sections and plates 2 inch thick and greater shall be detailed to limit the amount of weld metal. Double bevels shall be used in lieu of single bevels. Welding shall start at the most restrained part of the weldment and proceed to the least restrained.
 2. The Fabricator and Erector, as applicable, shall conduct all necessary tests required by AWS D1.1 to qualify the WPS.
 3. Provide certification that welders to be employed in work have satisfactorily passed AWS qualification tests for the welding process and position used and have been continuously employed as a welder since certification. If recertification of welders is required, retesting will be Contractor's responsibility.
- D. Stud Application Qualification Test:
 1. Prior to erection, conduct stud application qualification tests in accordance with AWS D1.1 Chapter 7.6 and Annex IX. The tests are the responsibility of the Contractor or stud applicator.
 2. Prepare specimen plates of A992 steel, minimum 1/2 inch thick, with an SP-6 surface preparation.
 3. Weld a minimum of ten (10) studs through steel deck to the prepared plate(s). The studs and steel deck shall be of the same type as specified for use in the project. Test the studs by the bend test specified in AWS 7.6.6 or Annex IX.
 4. If the tests are conducted by other than the Owner's testing agency, that agency shall be properly notified so that they may be present to witness the entire test procedure.

- E. Codes and Standards: Comply with the following, unless more stringent provisions are indicated:
1. Florida Building Code, 8th Edition.
 2. AISC 360, "Specification for Structural Steel Buildings."
 3. AISC 303, "Code of Standard Practice for Steel Buildings and Bridges".
 - a. Paragraph 4.4. "Approval" is modified such that the Structural Engineer will return submittals to the Architect within ten working days from time of receipt.
 4. AISC 341, "Seismic Provisions for Structural Steel Buildings," including Supplement No. 1.
 5. RCSC's "Specification for Structural Joints using High Strength Bolts." Approved June 22, 2010.
 6. AWS D1.1 "Structural Welding Code - Steel".
 7. ASTM A6 "Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling."
 8. S.S.P.C. Society for Protective Coatings.
 9. Occupational Safety and Health Act (OSHA), as amended to date.

1.10 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to site at such intervals to insure uninterrupted progress of work
- B. Deliver anchor rods and anchorage devices which are to be embedded in cast-in-place concrete or masonry in ample time to not delay work.
- C. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- D. Store fasteners in a protected place in sealed containers with manufacturer's labels intact until ready to use. Reseal open containers to prevent contamination by moisture or other deleterious substances. Store closed containers in a protective shelter to protect fasteners from dirt and moisture. Only as many fastener components as are anticipated to be installed during the work shift shall be taken from protective storage. Fastener components that are not incorporated into the work shall be returned to protective storage at the end of the work shift. Fasteners from open containers and fasteners that accumulate rust or dirt shall not be used and shall be immediately and permanently removed from the project site.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS

- A. Structural steel rolled W and WT shapes: ASTM A992, Grade 50.
- B. Structural steel rolled M, S, C and MC shapes and Angles: ASTM A36, Grade 36.
- C. Structural steel plates and bars: ASTM A36, Grade 36 and ASTM A572, Grade 50.
 - 1. All steel plates exceeding 2" in thickness shall conform to the requirements of ASTM A435, "Straight-Beam Ultrasonic Examination of Steel Plates", to assure delivery of steel plates free of gross internal discontinuities such as pipe, ruptures, or laminations. Plates shall be identified by stamping or stenciling "UT 435" adjacent to marking required by the material specification. The Fabricator shall submit to the Architect evidence of compliance by the mill with this requirement.
- D. Cold-formed hollow structural sections (HSS):
 - 1. Round sections: ASTM A500, Grade C, $F_y=46$ ksi.
 - 2. Square and Rectangular sections: ASTM A500, Grade C, $F_y=50$ ksi.
- E. Steel pipe: ASTM A53, Type E or S, Grade B, $F_y=35$ ksi.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. Unfinished threaded fasteners: ASTM A307, Grade A, regular low-carbon steel bolts and nuts.
 - 1. Provide square head and nuts.
- B. High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
 - 1. Direct-Tension Indicators: ASTM F959, Type 325-1, compressible-washer type with plain finish.
- C. High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A490, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
 - 1. Direct-Tension Indicators: ASTM F 959, Type 490-1, compressible-washer type with plain finish.
- D. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM F3125, Grade A325, Type 1, heavy-hex steel structural bolts; ASTM A563, Grade DH heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers.

1. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.
 2. Direct-Tension Indicators: ASTM F 959, Type 325-1, compressible-washer type with mechanically deposited zinc coating finish.
- E. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F3125, Grade F1852, Type 1, heavy-hex or round head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
1. Finish: Plain.
- F. Shear Connectors: ASTM A108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1, Type B with dimensions complying with AISC specifications.
- G. Headed Anchor Rods: ASTM F 1554, Grade 36, with supplementary requirement S1, straight.
1. Nuts: ASTM A563 heavy-hex carbon steel.
 2. Plate Washers: ASTM A36 carbon steel.
 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
 4. Finish: Mechanically deposited zinc coating, ASTM B 695, Class 50.

2.3 PRIMER

- A. Structural steel primer paint: SSPC – Paint 11 lead and chromate free, V.O.C. compliant, minimum solids 55% by volume. Use for steel not receiving special coatings or fireproofing. Refer to Architectural Drawings and Section 099113 “Exterior Painting,” Section 099123 “Interior Painting,” and Section 099600 “High Performance Coatings.”
1. Provide shop primer and shop applied top coat paint in accordance with Section 099113 “Exterior Painting,” Section 099123 “Interior Painting,” or Section 099600 “High Performance Coatings” where shown on the Architectural Drawings.
 2. Steel permanently exposed to the elements that does not receive a coating, such as cooling tower supports, shall be hot dip galvanized.

2.4 SHRINKAGE-RESISTANT GROUT

- A. Non-metallic shrinkage-resistant grout: Provide in accordance with Section 033000 “Cast-in-Place Concrete.”

2.5 MISCELLANEOUS

- A. Electrodes for welding: Comply with AWS D1.1-requirements.
1. For complete-joint penetration groove welds, weld metal shall have a charpy V-notch impact strength of 20 ft./lbs. –20°F.

2.6 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
1. Identify high-strength structural steel according to ASTM A6 and maintain markings until structural steel has been erected.
 2. Mark and match-mark materials for field assembly. Fabricate for delivery sequence that will expedite erection and minimize field handling of materials
 3. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
 4. Where finishing is required, complete the assembly, including welding before start of finishing operations. Provide finish surfaces of members exposed in final structure free of markings, burrs, and other defects.
- B. Camber: Camber structural-steel members as indicated on drawings.
1. Where possible, camber of beams shall be applied by a cold bend process. The local application of heat may be used to introduce or correct camber, curvature, or straightness, provided the temperature of the heated area, as measured by temperature crayons or other approved means, does not exceed 1200 F.
 2. Where indicated on the Drawings in a camber diagram, cantilever or double cantilever beams shall be cambered for the main span and cantilever end separately, either by a staged cold bending process or by the application of heat.
 3. Cambers indicated on the drawings are intended to be final cambers at time of erection. The fabricator shall account for camber loss in the initial camber operations and during transportation of material to the site.
 4. Beams and trusses detailed without specified camber shall be fabricated so that after erection any natural camber due to rolling or shop fabrication is upward.
 5. Specified camber for beams at time of erection shall be within a tolerance of minus zero to plus one-eighth inch for each ten feet of member length.
 6. Specified camber for trusses shall be built into the fabrication process with a tolerance of minus zero to plus 10% of the specified camber.
- C. Architecturally Exposed Structural Steel: Comply with fabrication requirements, including tolerance limits, of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for structural steel identified as architecturally exposed structural steel.
1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
 2. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
- D. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1.
- E. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel members.

1. Cut, drill, or punch holes perpendicular to metal surfaces. Do not flame cut holes, or enlarge holes by burning.
 2. Baseplate Holes: Drill holes perpendicular to steel surfaces
 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.
- F. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.

2.7 CONNECTIONS

- A. Splices in Structural Steel: Splicing of structural steel members in the shop or the field is prohibited without prior approval of the Architect. Any member having a splice not shown and detailed on approved shop drawings will be rejected.
- B. Compression Joints: Compression joints which depend on contact bearing as part of the splice capacity shall have the bearing surfaces of individual fabricated pieces prepared to a common plane by milling, sawing, or other suitable means.
- C. Bearing and Fit-Up of Column Compression Joints: Compression joints of all columns shall have bearing surfaces finished to a common plane by milling, sawing, or other suitable means. Lack of contact bearing must not exceed 1/16", or corrective measures as defined by AISC Section M4.4 shall be required.
- D. Connections:
1. Weld shop connections, as indicated. Comply with AWS D1.1 for welding procedure specifications, tolerances, appearance and quality of welds and for methods used in correcting welding work.
 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 3. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances of AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.
 4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances.
 - a. Grind butt welds flush.
 5. At welded beam-column flange joints, weld backing and run-off tabs shall be removed and repaired, including a 5/16" reinforcing fillet weld on the edge below the complete-joint-penetration groove weld. The exception that the top-flange backing is permitted to remain if it is attached to the column flange with a continuous fillet weld on the edge below the complete-joint-penetration groove weld.
 6. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specifications for Structural Joints using High Strength Bolts" for type of bolt and type of joint specified.
 7. Bolt field connections, except where welded connections are indicated.

8. Provide high-strength, threaded fasteners except for temporary bracing to facilitate erection or otherwise indicated.
 9. Faying surfaces, including coatings, for slip-critical connections shall have a minimum Class A slip coefficient.
- E. Turn-of-nut method of bolt tightening is not acceptable.
- F. Compression members composed of two or more rolled shapes separated from one another by intermittent fillers shall be connected to one another at such fillers spaced at intervals so that the least slenderness ratio, l/r , of either shape, between the fasteners, does not exceed the governing slenderness ratio of the built-up member.
- G. Struts and Braces: Connect struts and braces to resist 50% of the allowable tensile strength of the members, unless otherwise specified.
- H. Field Welded Construction: Comply with AWS D1.1 for procedures, appearance and quality of welds, and method used in correcting welding work.
- I. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions.
- J. Holes for other work: Provide holes required for securing other work to structural steel framing, and for passage of other work through steel framing members, as shown on final shop drawings.
- K. Provide weep hole in any confined steel surface capable of retaining water during erection or service. Seal weld as required to prevent migration of water into confined region.

2.8 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
1. Members or portions of members to be embedded in concrete or mortar. Prime embedded steel that is partially exposed on exposed portions and initial 2" of embedded areas only.
 2. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
 3. Members that are to be hot dip galvanized.
 4. Surfaces within 2" of welds.
 5. The faying surfaces of slip-critical bolted connections. The exception is for members that receive a coating system. There the faying surfaces should receive a primer providing a Class A surface, with a slip coefficient of 0.33. Submit substantiating data in conformance with Appendix A of the AISC "Specification for Structural Joints".
 6. Mask off and do not prime a strip 2" wide on any surfaces to receive a row of headed studs or puddle welds.

- B. Surface Preparation: After inspection and before shipping, clean steel work to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 6, "Commercial Blast Cleaning" for steel to be painted or receive a coating
 - 2. SSPC-SP 2, "Hand Tool Cleaning," or SSPC-SP 3, "Power Tool Cleaning" for all other conditions.
- C. Priming: Unless specified otherwise in Section 099113 "Exterior Painting" or Section 099123 "Interior Painting," immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 2.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces. Refer to Section 099600 "High Performance Coatings" for priming and painting members to receive special coatings.
- D. Steel members which cannot be readily painted after fabrication, such as back-to-back angles and tees, shall be primed and finish coated, or receive two coats of primer, prior to fabrication.
- E. Do not print or emboss the name of the fabricator on exposed steel unless it is completely concealed by the finish painting.

2.9 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel members permanently exposed to the elements, such as cooling tower support steel, according to ASTM A123.
 - 1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
 - 2. Galvanize cooling tower support steel, lintels, and shelf angles attached to structural-steel frame and located in exterior walls.

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, bearing pads, and other embedments for compliance with requirements.
 - 1. Surveys: Employ a Florida Licensed Engineer or Land Surveyor for accurate erection of structural steel. Check elevations of concrete and masonry bearing surfaces and locations of anchor bolts and similar devices, before erection work proceeds, and report discrepancies to Architect. Do not proceed with erection

until corrections have been made, or until compensating adjustments to structural steel work have been agreed upon with Architect.

- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Temporary shoring and bracing: Provide temporary shoring and bracing members and connections of sufficient strength to bear imposed loads from steel self weight and erection procedures or any other loads created by other contractors on a temporary basis. Remove temporary members and connections when permanent members are in place and final connections are made. Provide temporary guidelines to achieve proper alignment of structures as erection proceeds.
 - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.
- B. Temporary planking: Provide temporary planking and working platforms as necessary to effectively complete work.

3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Baseplates and Bearing Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
 - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
 - 2. Weld plate washers to top of baseplate.
 - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
 - 4. Promptly pack grout solidly between bearing surfaces and base plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
 - 5. Base plates must be grouted a minimum of 72 hours prior to placing concrete slabs on supporting steel structure.
- C. Anchor rods and bolts: Furnish anchor rods, bolts and other connectors required for securing structural steel to foundations and other in-place work.
 - 1. Furnish templates and other devices as necessary for pre-setting rods, bolts and other anchors to accurate locations.
 - 2. Refer to Section 3 of these specifications for anchor rod installation requirements in concrete, and Section 4 for masonry installation.

- D. Maintain erection tolerances of structural steel and architecturally exposed structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."
- E. Field assembly: Set structural members accurately to lines and elevations indicated. Align and adjust various members forming a part of a complete frame or structure before permanently fastening. Clean bearing surfaces and other surfaces which will be in permanent contact before assembly. Perform necessary adjustments to compensate for discrepancies in elevations and alignment. Comply with AISC Code of Standard Practice except where more stringent requirements are contained herein.
 - 1. Level and plumb individual members of structure within specified AISC tolerances.
 - 2. Establish required leveling and plumbing measurements on mean operating temperature of structure. Make allowances for difference between temperature at time of erection and mean temperature at which structure will be when completed and in service.
- F. Erection bolts: On exposed welded construction, remove erection bolts, fill holes with plug welds and grind smooth at exposed surfaces.
- G. Comply with AISC Specification for bearing, adequacy of temporary connections, alignment, and removal of paint on surfaces adjacent to field welds.
- H. Splice members only where indicated and accepted on shop drawings.
- I. Thermal cutting: Do not use gas-cutting torches in field for correcting fabrication errors in primary structural framing. When permitted, finish gas-cut sections equal to a sheared appearance by grinding or reaming. Do not use gas cutting to fabricate bolt holes.
- J. Do not enlarge unfair holes in members by burning or by use of drift pins. Ream holes that must be enlarged to admit bolts as permitted by Architect.
- K. Headed shear studs: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1 and manufacturer's written instructions. All welding ferrules for shear connectors shall be removed prior to placement of concrete.

3.4 FIELD CONNECTIONS

- A. Store fastener components in sealed containers until ready for use. Reseal open containers to prevent contamination by moisture or other deleterious substances. Store closed containers from dirt and moisture in a protective shelter. Take from protective storage only as many fastener components as are anticipated to be installed during the work shift. Fastener components that are not incorporated into the work shall be returned to protective storage at the end of the work shift. Fasteners from open containers and fasteners that accumulate rust or dirt shall not be used and shall be immediately and permanently removed from the project site.

- B. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using High Strength Bolts" for type of bolt and type of joint specified.
 - 1. Joint Type: Snug tightened.
- C. Tighten bearing-type bolts (GR A325N, GR A325X, GR A490N, and GR A490X) to the snug tight condition as follows:
 - 1. Bolts shall be placed in all holes, with washers positioned as required and nuts threaded to complete the assembly.
 - 2. Compacting the joint to the snug-tight condition shall progress systematically from the most rigid part of the joint.
 - 3. The snug-tightened condition is the tightness that is attained with a few impacts of an impact wrench or the full effort of an ironworker using an ordinary spud wrench.
 - 4. More than one cycle through the bolt pattern may be required to achieve the snug-tightened joint.
- D. Tighten slip-critical bolts (GR A325SC, GR A325TC, GR A490SC, and GR A490TC) to the minimum fastener tension indicated in Table 8.1 of the "Specification for Structural Joints using High Strength Bolts" as follows:
 - 1. Confirm with Architect on which face of the connection the round head of the TC bolt shall be located for exposed connections.
 - 2. Begin final tightening of slip-critical bolts only after a snug-tight joint as described above is achieved. Progress systematically from the most rigid part of the joint.
 - 3. If splined end of tension-control bolts is severed prior to achieving snug-tight joint, remove and replace the fastener assembly.
 - 4. Progress systematically from the most rigid part of the joint in a manner that will minimize relaxation of previously pretensioned bolts.
 - 5. Determine tension using either load indicator washers, tension-control bolts, or a calibrated torque wrench.

At the Contractor's option, slip-critical bolts may be installed in either standard, oversize, or short slotted holes. Design of connections using slip-critical bolts is based on a Class A faying surface and oversized holes.
- E. Provide hardened washers conforming to ASTM F436 and place under the part being turned.
- F. Do not reuse or retighten bolts which have been fully tightened. Use only non-galvanized nuts and bolts that are clean, rust-free, and well lubricated. Bolts and nuts shall be wax dipped by the bolt supplier or lubricated with Castrol Industrial Stick Wax.
- G. Cleaning and lubrication of ASTM F3125, GR F1852 and GR F2280 twist-off-type tension-control bolt assemblies is not permitted.
- H. Where slotted holes are used to accommodate thermal movement, notify the Architect if bolt is expected to hit the end of slot, based on temperature at time of installation.

- I. Weld Connections: Comply with AWS D1.1 for tolerances, appearances, welding procedure specifications, weld quality, and for used in correcting welding work.
 - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
 - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.
 - 3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.
 - 4. Verify that weld sizes, fabrication sequence, and equipment used for architecturally exposed structural steel will limit distortions to allowable tolerances.
 - a. Grind butt welds flush.
 - b. Dress exposed welds.
- J. Protect bearing pads from damage by field welding or cutting operations and provide noncombustible shields as required.

3.5 QUALITY CONTROL

- A. Shop Quality Control:
 - 1. The Fabricator shall provide a system of quality control, including shop welding inspections and testing, to ensure that the minimum standards specified herein are attained. Submit to Owner, Architect, Engineer and Owner's Testing and Inspection Agency complete details of the quality control program to be used and all testing and inspection reports. Visually inspect 100% of shop welds. Also, as a minimum, perform non-destructive tests of welds in conformance with AWS D1.1 as follows:
 - a. Splices: 100%.
 - b. Full penetration welds: 100%.
 - c. Partial penetration welds: 50%.
 - d. Fillet welds: 5%.
 - 2. The fabricator may use the following examination methods, in descending order of importance. When a particular examination method for a joint is unfeasible, the highest order method that is practicable shall be used. Standard of acceptance shall be in accordance with AWS D1.1.
 - a. Ultrasonic Method: In accordance with AWS D1.1.
 - b. Radiographic Method: In accordance with ASTM E94 and ASTM E142, with a minimum quality level of "2-2T". This procedure is limited to the inspection of groove welds in butt joints only and is not to be used for fillet welds.
 - c. Magnetic Particle Method: In accordance with ASTM E709. Use for examining partial penetration welds. Percentage of examinations is defined elsewhere in these specifications. The Yoke method may be used only for supplementary surface examination.

- d. Dye Penetrant Examination Method: In accordance with ASTM E165.
- 3. The Fabricator shall ultrasonically inspect for laminations all joints where material is subjected to tension in the through thickness direction. Ultrasonic inspection shall extend for a distance of six times the material thickness subject to the through thickness tension, either side of the element delivering the tension.
- B. Shop testing and inspection by the Owner is to evaluate the effectiveness of the Fabricator's required Quality Control and Assurance Program.
- C. Owner will engage a Structural Inspector to perform field inspections pursuant to the Structural Inspection Plan presented on the Drawings.
- D. Testing agency shall conduct and interpret tests and state in each report whether test specimens comply with requirements, and specifically state any deviations therefrom.
- E. Provide access for testing agency to places where structural steel work is being fabricated or produced and unobstructed views to all members in nearby storage so that required inspection and testing can be accomplished.
- F. Testing agency may inspect structural steel at plant before shipment; however, Architect reserves the right, at any time before final acceptance, to reject material not complying with specified requirement.
- G. Correct deficiencies in structural steel work which inspections or laboratory test reports have indicated to be not in compliance with requirements. Perform additional tests, at Contractor's expense, as may be necessary to reconfirm any noncompliance of original work, and as may be necessary to show compliance of corrected work.
- H. Shop Inspection and Tests: Testing Agency may inspect and test during fabrication of structural steel assemblies, as follows:
 - 1. Review shop drawings and shop procedures with Fabricator's supervisory personnel.
 - 2. Request and obtain necessary mill certifications of steel and verify proper material throughout the duration of the job.
 - 3. Verify welding procedure qualifications, either by prequalifications or by witnessing qualification tests.
 - 4. Verify welder qualifications, either by certification and/or by retesting. Obtain welder certificates.
 - 5. Spot check layout and dimensions of jigs and fixtures for joint preparation, and fit up of members.
 - 6. Verify welding electrodes to be used and other welding consumables as the job progresses.
 - 7. Check preheating procedures for conformance to AWS D1.1.
 - 8. Verify procedures for welding in accordance with applicable portions of section 4, "Technique", AWS D1.1.
 - 9. Verify that quality of welds meet the requirements of Paragraph B.15, "Quality of Welds", AWS D1.1.
 - 10. Provide inspection of surface preparation for coating and coating operations in accordance with SSPC VIS 1 and 2.

11. Perform visual inspection of all welds for compliance with Contract Documents. Provide random non-destructive tests of welds in conformance with Section 6 of AWS D1.1, as may be required by Architect, but not less than:
 - a. Full penetration welds: 25%.
 - b. Partial penetration welds: 15%.
 - c. Fillet Welds: 5%.
 12. Testing laboratory may use the following examination methods, in descending order of importance. When a particular examination method for a joint is unfeasible, the highest order method that is practicable shall be used. Standard of acceptance shall be in accordance with AWS D1.1.
 - a. Ultrasonic Method: In accordance with AWS D1.1.
 - b. Radiographic Method: In accordance with ASTM E94 and ASTM E142, with a minimum quality level of "2-2T". This procedure is limited to the inspection of groove welds in butt joints only and is not to be used for fillet welds.
 - c. Magnetic Particle Method: In accordance with ASTM E709. Use for examining partial penetration welds. Percentage of examinations is defined elsewhere in these specifications. The Yoke method may be used only for supplementary surface examination.
 - d. Dye Penetrant Examination Method: In accordance with ASTM E165.
 13. Ultrasonically inspect for laminations after welding all joints with rolled shapes and plates greater than 1 1/2" thick, where material is subjected to tension in the through thickness direction. The ultrasonic inspection shall extend for a distance of six times the thickness of the plate receiving the through thickness tension, either side of the plate delivering the tension.
 14. Interpret, record, and report all results of the non-destructive tests.
 15. Mark for repair, any area not meeting Specification requirements. Correction of rejected welds shall be made in accordance with Paragraph 5.26, "Repairs", AWS D1.1
 16. Re-examine all repair areas and interpret, record, and report the results of examinations of repair welds.
- I. Field Inspection and Tests: Inspect and Test during the erection of structural steel assemblies as directed by the Engineer of Record, but not less than the following:
1. Verify field welding procedures and obtain welder certificates.
 2. Check joint preparation and fit up, backing strips, and runout plates.
 3. Check preheating to assure proper temperature, uniformity, and thoroughness through the full material thickness.
 4. Review welding sequence.
 5. Inspector shall perform visual inspection of all welds for compliance with Contract Documents. Testing Agency shall perform non-destructive tests of welds in conformance with Section 6 of AWS D1.1 as may be required by Architect, but not less than:
 - a. Splices: 100%.
 - b. Full Penetration Welds: 100%.

- c. Partial Penetration Welds: 50%.
 - d. Fillet Welds: All welds that do not pass the visual inspection.
 - 6. Check 100% of bolted connections according to inspection procedures outlined in the "Specification for Structural Joints using High Strength Bolts" and as required elsewhere in these specifications.
 - 7. Production Stud Application Testing: Test the first two studs per welder per day for each set-up and size and type of stud. Test by bending studs 30 degrees using a 4 lb. hammer per AWS D1.1 Section 7.7. Use a 4 lb. hammer to sound 100% of studs. A pinging sound usually represents a sound weld. Studs that produce a "thud" should be bend tested. Passing studs may remain bent while failing studs must be replaced.
 - 8. Interpret, record, and report all results of the non-destructive tests.
 - 9. Mark for repair any area not meeting Specification requirements. Correction of rejected welds shall be made in accordance with Paragraph 5.26, "Repairs", AWS D1.1.
 - 10. Re-examine all repair areas and interpret, record, and report the results of examinations of repair welds.
- J. Pre-installation testing of as-received fastener assemblies shall be performed according to the Specifications for Structural Joints using High Strength Bolts, Section 7 and as follows:
- 1. Tension Calibrator (a hydraulic device that indicates the pretension that is developed in a bolt that is installed in it) shall be provided by the testing agency, at the Project Site, to confirm the tension force in the fastener assembly.
 - 2. A sample of not fewer than three complete fastener assemblies from each shipping container shall be checked at the
 - 3. Fastener assemblies tested shall develop a pretension force not less than 1.05 times that required by Table 8.1 in AISC. Minimum passing test force: A325: $3/4"=29.4$ kips, A490: $1"=67.2$ kips.

3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A780.
- 1. Apply Zinc-Clad Cold Galvanizing by Sherwin-Williams or Cold Galvanizing Compound by ZRC Worldwide by brush or spray to provide a minimum dry film thickness of 3 mils.
- B. Touchup Painting: Immediately after erection, clean slag from field welds, clean bolted connections, and abraded areas of shop paint. Apply paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

- C. Touchup Priming: For steel having special coatings system, reapply both primer and top coat as specified in Section 099600 "High-Performance Coatings."

END OF SECTION 051200

SECTION 052100 - STEEL JOIST FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. K-series steel joists.
 - 2. KCS-type, K-series steel joists.
 - 3. K-series steel joist substitutes
 - 4. LH-series long-span steel joists.
 - 5. Steel joist accessories.
- B. Related Sections include the following:
 - 1. Section 033000 "Cast-in-Place Concrete" for installing bearing plates in concrete.
 - 2. Section 042000 "Unit Masonry" for installing bearing plates in unit masonry.
 - 3. Section 051200 "Structural Steel" for Steel Joist support framing.
 - 4. Section 053100 "Steel Deck" for fastening requirements to Steel Joists.
 - 5. Section 055000 "Metal Fabrications" for miscellaneous steel framing used with Steel Joists.
 - 6. Section 078100 "Applied Fireproofing".

1.3 DEFINITIONS

- A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B. Special Joists: Steel joists or joist girders requiring modification by the manufacturer to support wind net uplift pressures, concentrated loads, non-uniform loads, unequal loads or other special loading conditions that invalidate SJI's "Standard Specifications Load Tables and Weight Tables for Steel Joists and Joist Girders."

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product.
- B. Shop Drawings:

1. Show layout, mark, number, type, location, and spacing of joists. Include joist length, camber, joining and anchorage details, bracing, bridging, accessories; splice and connection locations and details; and attachments to other construction.
2. Indicate locations and details of anchorage devices and bearing plates to be embedded in other construction.
3. Indicate loads on all special joists, including loading diagrams and wind net uplift pressures.
4. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.
5. Do not fabricate or erect joists prior to the approval of shop drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- B. Welding certificates: Copies of certificates for welding procedures and personnel.
- C. Manufacturer certificates.
- D. Mill certificates signed by manufacturers of bolts certifying that their products comply with specified requirements.
- E. Design Letter: The Fabricator is responsible for designing and detailing all joists and seats, particularly special joists, in accordance with the Contract Documents and SJI requirements. This work shall be done by a Florida Licensed Engineer experienced in similar work and retained by the Fabricator. Prior to the first submittal, this Engineer shall submit a signed and sealed letter stating that the Engineer accepts responsibility for design and detailing of all joists on the Project. The drawings do not require signature and seal.
- F. Field quality-control reports.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."
 1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code--Steel"; and SJI Technical Digest #8, "Welding of Open Web Steel Joists and Joist Girders".

- C. Inspection: Members shall be inspected by the manufacturer before shipment to insure compliance of materials and workmanship with the requirements of these specifications.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

1.8 SEQUENCING

- A. Deliver steel bearing plates and other devices to be built into cast-in-place concrete and masonry construction.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Canam Steel Corporation; Canam Group, Inc.
 - 2. New Millennium Building Systems, LLC.
 - 3. Valley Joist.
 - 4. Vulcraft; Nucor Corporation, Verco Group.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide joists, special joists and connections capable of withstanding design loads within limits and under conditions indicated on drawings, including joists subject to wind net uplift. All joists on this project are Special Joists requiring special design for wind up lift.
 - 1. Chord and web tension and compression forces are reversed in joists subject to wind net uplift. Modify joist elements if required by analysis, possibly including increasing bottom chord, reducing bridging spacing, and/or increasing the size or quantity of web elements. Refer to SJI Technical Digest No. 6, "Structural Design of Steel Roof Joists to Resist Uplift Loads."
 - 2. Carefully investigate the design of seats of joists subject to wind net uplift. Standard joist seats are often inadequate to resist wind uplift forces.
- B. Design joists to withstand design loads, with live and wind load deflections each no greater than the following:
 - 1. Roof Joists: Vertical deflection of 1/360 of the span.

2.3 MATERIALS

- A. Steel: Comply with SJI's "Specifications" for chord and web members.
- B. Steel Bearing Plates: ASTM A 36.

2.4 OPEN-WEB STEEL JOISTS

- A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series," in SJI's "Specifications," with steel-angle top and bottom-chord members, underslung ends, and parallel top chord.
 - 1. Joist Type: K-series steel joists and KCS-type K-series steel joists.
 - 2. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications." With steel-angle or channel members.
- B. Manufacture long span steel joists according to "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series," in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as indicated.
 - 1. Joist Type: LH-series steel joists and DLH- series steel joists.
 - 2. End Arrangement: Underslung.
 - 3. Top-Chord Arrangement: Parallel.
- C. Provide holes in chord members for connecting and securing other construction to joists.
- D. "Top-Chord Extensions: Extend top chords of joists with SJI's Type S top-chord extensions where indicated, complying with SJI's "Specifications."
- E. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
- F. Header Units: Any situation requiring heading of joists not shown on the structural drawings shall be referred to engineer for framing.
- G. Splices in Chord Members: All splices shall be designed and provided in accordance with SJI Specifications. The splices in each of the two angles or bars of all members shall not be at the same location, but shall be staggered a minimum of 6 inches.
- H. Camber members according to SJI's "Specifications" unless otherwise indicated.
- I. Joist Bearing: Provide minimum end bearing of joists and joist girders as required by SJI's "Specifications" but subject to requirements below, unless detailed otherwise on the drawings:
 - 1. If two joists do not abut each other at a support, provide required joist bearing centered on the supporting member.

2. If two joists abut each other at a support and sufficient minimum bearing for each joist exists, provide 1/4" space between joist ends centered over the support.
 3. If two joists abut each other at a support and sufficient minimum bearing for each joist does not exist at the support, offset the ends of each joists and center joist bearing on the center of the support.
- J. Equip bearing ends of members with manufacturer's standard beveled ends or sloped shoes if member slope exceeds 1/4 inch per 12 inches.

2.5 PRIMERS

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15. Primer must be compatible with fireproofing, where applicable.

2.6 STEEL JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type as indicated or, where not indicated, as required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required. Where applicable, provide bridging to meet the requirements of OSHA.
- B. Fabricate steel bearing plates from ASTM A36 steel with integral anchorages of sizes and thicknesses indicated. Shop prime paint.
- C. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.
- D. Carbon-Steel Bolts and Threaded Fasteners: ASTM A307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
1. Finish: Plain, uncoated.
- E. High-Strength Bolts and Nuts: ASTM F3125 Grade A325, Type 1, heavy hex steel structural bolts; ASTM A563 heavy hex carbon-steel nuts; and ASTM F436 hardened carbon-steel washers.
1. Finish: Plain, uncoated.
- F. Welding Electrodes: Comply with AWS standards.
- G. Galvanizing Repair Paint: ASTM A780.
- H. Furnish miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

2.7 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories to be primed by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- B. Apply one shop coat of primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
 - 1. Before installation, splice joists delivered to Project site in more than one piece.
 - 2. Space, adjust, and align joists accurately in location before permanently fastening.
 - 3. Secure joists resting on masonry or concrete bearing surfaces by bedding in mortar and anchoring to masonry or concrete construction as specified in SJI "Specifications" for type of steel joist used or as shown on drawings.
 - 4. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
 - 5. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads have been applied.
- C. Erection Stability and Handling: When it is necessary for the erector to climb on the joists, extreme caution must be exercised since unbridged joists may exhibit some degree of instability under the erector's weight. The contractor shall provide means for adequate distribution of concentrated loads so that the carrying capacity of any joist is not exceeded. Erection must comply with OSHA requirements and SJI Technical Digest #9, "Handling and Erection of Steel Joists and Joist Girders". Construction safety is the sole responsibility of the Contractor.
- D. Field weld joists to supporting steel bearing plates and framework where indicated. Coordinate welding sequence and procedure with placement of joists. Comply with

AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

- E. Bolt joists to supporting steel framework using carbon-steel or high-strength bolts as indicated on the Drawings. High-strength bolts shall comply with Research Council on Structural Connection's "Specification for Structural Joints Using High Strength Bolts" for high-strength structural bolt installation and tightening requirements.
- F. Install and connect bridging concurrently with joist erection, before decking is erected or construction loads are applied, to ensure lateral stability during construction. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.
 - 1. After erection, remove temporary bridging as required for architectural, structural and mechanical clearance.

3.3 ATTACHMENTS TO JOISTS

- A. The Contractor shall ensure that no cuts or holes are made in the members of the erected joists for attachment of ceiling, ducts, pipes, or any other items not specifically shown in the contract drawings. Use of powder driven fasteners in joist diagonal and bottom chord members is prohibited.
- B. The Contractor shall not hang any elements from joists except ceiling, ducts, pipes or other items specifically shown on the Contract Documents. Heavy pipes, ducts, or other equipment hung from steel joists may require additional joist reinforcement and shall be referred to the Architect for framing.
- C. Ceiling weighing 3 psf or less may have the grid hung anywhere along the joist bottom chord. Ceilings weighing more than 3 psf and all pipes, ducts and other mechanical, electrical, and plumbing equipment suspended from the joists shall have the hanger attached at a joist panel point only, except as approved otherwise in writing by the Architect.

3.4 FIELD QUALITY CONTROL

- A. Owner will engage a Threshold Inspector and a qualified independent inspecting agency to inspect field welds and high-strength bolted connections, and prepare test and inspection reports.
- B. Visually inspect field welds according to AWS D1.1.
- C. Visually inspect bolted connections
 - 1. High-strength, field-bolted connections will be tested and verified according to procedures in Research Council on Structural Connection's "Specification for Structural Joints Using ASTM A325 or ASTM A 490 Bolts."
- D. Correct deficiencies in Work that inspections have indicated are not in compliance with specified requirements.

- E. Perform additional testing to determine compliance of corrected Work with specified requirements.

3.5 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel and accessories.
 - 1. Clean with solvent and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
 - 2. Apply a compatible primer of the same type as the shop primer used on adjacent surfaces.
- C. Touchup Painting: Cleaning and touchup painting are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."
- D. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 052100

SECTION 053100 - STEEL DECK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Roof deck.
 - 2. Acoustical roof deck.
 - 3. Composite floor deck.
- B. Related Sections include the following:
 - 1. Section 033000 "Cast-in-Place Concrete" for concrete fill over steel deck
 - 2. Section 051200 "Structural Steel Framing" for shop and field welded shear connectors.
 - 3. Section 055000 "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated, or requested by the Architect.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding Certificates: Copies of certificates for welding procedures and personnel. Submit to general contractor and Special Inspector.
- B. Product Certificates: Signed by steel deck manufacturers certifying that products furnished comply with requirements.
- C. Product Test Reports: Based on evaluations of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

1. Power-actuated mechanical fasteners.
 2. Acoustical roof deck
- D. Research Reports: For steel deck, from ICC-ES.
- E. Field quality-control test and inspection reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E329 to conduct the testing indicated, as documented according to ASTM E548.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1, "Structural Welding Code - Steel," and AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. Manufacturer Qualifications: Member of the Steel Deck Institute.
- D. Installer Qualifications: An experienced installer who has completed steel deck installations similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- E. Fabrication and Erection: Fabricate and erect deck per the Steel Deck Institute's "Design Manual for Composite Decks, Form Decks and Roof Decks".
1. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- F. Codes and Standards: Comply with Florida Building Code, 8th Edition.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."

- B. Fire-Resistance Ratings: Comply with ASTM E119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency acceptable to authorities having jurisdiction.

2.2 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Steel Deck:
 - a. Canam Steel Corporation: Canam Group Inc.
 - b. Coredeck
 - c. DACS, Inc.
 - d. Epic Metals Corporation.
 - e. Marlyn Steel Decks, Inc.
 - f. New Millennium Building Systems, LLC
 - g. Nucor Corporation.
 - h. Nucor Corporation, Verco Group
 - i. Roof Deck, Inc.

2.3 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and the following:
 - 1. Galvanized Steel Sheet: ASTM A653, Structural Steel (SS), Grade 40, G90 zinc coating.
 - 2. Deck Profile; Depth and Design Uncoated-Steel Thickness: As indicated on Drawings.
 - 3. Span Condition: Triple span typical, double span minimum, U.O.N. on Drawings.
 - 4. Side Laps: Overlapped.

2.4 ACOUSTICAL ROOF DECK

- A. Acoustical Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
 - 1. Galvanized, Shop-Primed, and Shop-Finish Painted Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 40, G90zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.

- a. Color: As required by architectural drawings, submit color samples for selection.
2. Deck Profile: Toris A by Epic Metals or product equal to and acceptable to Architect.
3. Profile Depth: 2 ½".
4. Design Uncoated-Steel Thickness: 20 gage.
5. Span Condition: Double span or more.
6. Side Laps: Overlapped
7. Acoustical Perforations: Deck units with manufacturer's standard perforated flat-bottom plate dove tail ribbed deck.
8. Sound-Absorbing Insulation: Manufacturer's standard premolded roll or strip of glass or mineral fiber
9. Acoustical Performance: NRC 0.95, tested according to ASTM C 423.
10. Provide air dams at exterior walls in deck flutes.
11. Fasten roofing to top of dovetail ribs only concealed within the depth of the dovetail shaped ribs.
12. Fasten to structure with mechanical fasteners.
13. Align deck ribs to form a continuous linear appearance from the room below.

2.5 COMPOSITE FLOOR DECK

- A. Composite Steel Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, the minimum section properties indicated, and the following:
 1. Galvanized Steel Sheet: ASTM A653, Structural Steel (SS), Grade 40 G90 zinc coating.
 2. Shear Lugs (Web Embossments): 0.050 inch high (min.).
 3. Profile Depth and Design Uncoated-Steel Thickness: As indicated on Drawings.
 4. Span Condition: Triple span typical, double span minimum, U.O.N. on Drawings.

2.6 ACCESSORIES

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

- F. Steel Sheet Accessories: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- G. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth unless otherwise indicated.
- H. Column Closures, End Closures, Z-Closures, and Cover Plates:
 - 1. Epicore Metals Corporation: Sheet steel of same material and finish, 10 gauge or less, unless otherwise indicated.
 - 2. All others: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- I. Wedge Bolt hanging devices (which include Wedge Locks) or Ankore hanging devices (which include Ankore Locks) shall be installable and relocatable anywhere along the length of the interior ribs of the dovetailed deck panels. Manufacturer's product data shall be consulted for minimum spacing, load capacities, and proper installation procedure or the Wedge Bolt or Ankore Hanging devices. Hangers shall be U.L. approved for use as supports of sprinkler pipes.
- J. Air dams shall be provided for acoustic decking at all exterior walls.
- K. Provide recessed or flat sump pan in accordance with roof drain requirements. Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck. Recessed sump pans shall have with 3-inch wide flanges and be leveled recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- L. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B, with dry film containing a minimum of 94 percent zinc dust by weight. Manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Galvacon Cold Galvanizing Compound: Lanco Inc.
 - 2. ZRC Cold Galvanizing Compound: ZRC Worldwide, Inc.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, manufacturer's written instructions, and requirements in this Section.

- B. Deck has been designed to span unshored, U.O.N. on Drawings.
- 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.
 - 1. Align acoustical deck panels over full length of run.
- 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 decking.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, 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 not be used in lieu of welding to fasten deck unless specifically allowed by the local product approval for the roofing system and approved by the Engineer of Record. Provide mechanical fasteners according to deck manufacturer's written instructions and per the Structural Notes on the Drawings.

3.3 ROOF DECK INSTALLATION

- A. Fasten roof deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or by mechanical fasteners as follows:
 - 1. Weld Diameter: As indicated on the Drawings.
 - 2. Weld Spacing: Weld deck units as indicated on the Drawings.
 - 3. Fastener Diameter: As indicated on drawings.
 - 4. Fastener Spacing: As indicated on drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, as indicated on the Drawings.
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum.
- D. For acoustic deck exposed to view: Align deck flutes to provide a continuous linear appearance parallel to the walls.

- E. Roof Sump Pans and Sump Plates: Install over openings provided in roof decking and weld flanges to top of deck. Space welds not more than 12 inches apart with at least 1 weld at each corner.
 - 1. Install reinforcing channels or zees in ribs to span between supports and mechanically fasten.
- F. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- G. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated at non-fire-resistance-rated partitions. Install with adhesive according to manufacturer's written instructions to ensure complete closure.
- H. Sound-Absorbing Insulation: Installation into topside ribs of deck immediately prior to roofing installation. Contractor to take precautions necessary to prevent insulation from getting wet.

3.4 FLOOR DECK INSTALLATION

- A. Fasten floor deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
 - 1. Weld Diameter: As indicated on the Drawings.
 - 2. Weld Spacing: Space and locate welds as indicated on the drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, as indicated on the Drawings.
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Butted at composite floor deck and lapped or butted at noncomposite form deck.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations, unless otherwise indicated.
- E. Floor Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of decking. Weld cover plates at changes in direction of floor deck panels, unless otherwise indicated.

3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

3.6 FIELD QUALITY CONTROL

- A. Testing: Owner will engage a qualified independent testing agency to perform field quality-control testing.
- B. Field welds will be subject to inspection.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional testing and/or inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

END OF SECTION 053100

SECTION 054000 - COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Exterior non-load-bearing wall framing.
- 2. Soffit framing.

- B. Related Requirements:

- 1. Section 033000 "Cast-In-Place Concrete."
- 2. Section 055000 "Metal Fabrications".
- 3. Section 092116.23 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.
- 4. Section 092216 "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

1.3 ACTION SUBMITTALS

- A. Product Data and Installation Instructions: For each type of cold-formed steel framing product and accessory, including fasteners, materials, and finishes.

- B. Shop Drawings:

- 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
- 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
 - a. For cold-formed metal framing indicated to comply with design loads, shop drawings and calculations shall be signed and sealed by the delegated (specialty) engineer responsible for their preparation.

- C. Delegated-Design Submittal: For cold-formed steel framing.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project name and addresses, names and addresses of architects and owners, and other information specified.
- B. Welding certificates.
- C. Product Test Reports: For each listed product, for tests performed by a qualified testing agency.
 - 1. Steel sheet.
 - 2. Expansion anchors.
 - 3. Power-actuated anchors.
 - 4. Mechanical fasteners.
 - 5. Vertical deflection clips.
 - 6. Horizontal drift deflection clips
 - 7. Miscellaneous structural clips and accessories.
- D. Research Reports: For non-standard cold-formed steel framing, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Product Tests: Mill certificates or data from a qualified independent testing agency, or in-house testing with calibrated test equipment indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- B. Qualifications:
 - 1. Fabricator Qualifications: Company with not less than five (5) documented satisfactory experiences designing and fabricating cold-formed steel framing systems equal in material, design and extent to the systems required for this Project.
 - 2. Installer Qualifications: An experienced installer who has completed cold-formed metal framing similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
 - 2. AWS D1.3/D1.3M, "Structural Welding Code - Sheet Steel."
- D. Engineering Responsibility: Engage a delegated licensed engineer to prepare design calculations, Shop Drawings, and other structural data.
- E. Delegated Engineer: A licensed engineer who is legally qualified to practice in State of Florida and who is experienced in providing engineering services of the kind indicated.

Engineering services are defined as those performed for installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

- F. Codes and Standards: Comply with the following, unless more stringent provisions are indicated:
1. Florida Building Code, 8th Edition.
 2. ASCE 7, "Minimum Design Loads for Buildings and Other Structures."
 3. AWS D1.1, "Structural Welding Code - Steel."
 4. AWS D1.3, "Structural Welding Code - Sheet Steel."

See "Performance Requirements" for additional codes and standards.

1.6 FIELD MEASUREMENTS

- A. Verify all dimensions and conditions by field measurement. Indicate and flag on shop drawings all discrepancies between actual conditions and contract documents.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in manufacturer's unopened containers or bundles, fully identified by manufacturer's name, job number, and member number. Exercise care to avoid damage during unloading, storing and erection.
- B. Store framing members on blocking, pallets, platforms or other supports off the ground, sufficiently braced to avoid damage from excessive bending.
- C. Protect cold-formed steel framing from corrosion, moisture staining, deformation, and other damage during delivery, storage, and handling.

1.8 PROJECT CONDITIONS

- A. During construction, adequately distribute all loads applied to member so as not to exceed the carrying capacity of any framing member.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
1. AllSteel & Gypsum Products, Inc.
 2. ClarkWestern Building Systems, Inc.
 3. Consolidated Fabricators Corp.; Building Products Division.

4. Craco Mfg., Inc.
5. Dietrich Metal Framing; a Worthington Industries Company.
6. MarinoWARE.
7. Nuconsteel; a Nucor Company.
8. SCAFCO Corporation.
9. Southeastern Stud & Components, Inc.
10. Steel Construction Systems.
11. Steel Network, Inc. (The).
12. Steel Structural Systems.
13. Super Stud Building Products, Inc.
14. Telling Industries, LLC.

2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design cold-formed steel framing.
- B. Structural Performance: Provide cold-formed steel framing capable of withstanding design loads within limits and under conditions indicated.
 1. Design Loads: As indicated on drawings or required by Code.
 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height.
 - b. Soffit Framing: Vertical deflection of 1/240 of the horizontally projected span for live loads.
 3. Design framing systems to provide for movement of framing members located outside the insulated building envelope without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
 - a. Upward and downward movement of 3/4 inch.
 5. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.
- C. Cold-Formed Steel Framing Design Standards:
 1. Floor and Roof Systems: AISI S210.
 2. Wall Studs: AISI S211.
 3. Headers: AISI S212.
 4. Lateral Design: AISI S213.

- D. AISI Specifications and Standards: Unless more stringent requirements are indicated, comply with AISI S100 and AISI S200.
- E. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.3 COLD-FORMED STEEL FRAMING, GENERAL

- A. Steel Sheet: ASTM A 1003, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G90.
- B. Steel Sheet for Vertical Deflection Drift Clips: ASTM A 653, structural steel, zinc coated, of grade and coating as follows:
 - 1. Grade: As required by structural performance.
 - 2. Coating: G90.

2.4 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: 0.0428 inch.
 - 2. Flange Width: 1-5/8 inches.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
 - 1. Minimum Base-Metal Thickness: Matching steel studs.
 - 2. Flange Width: 1-1/4 inches.
- C. Vertical Deflection Clips: Manufacturer's standard bypass and/or head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
 - 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. AllSteel & Gypsum Products, Inc.
 - b. ClarkWestern Building Systems, Inc.
 - c. Dietrich Metal Framing; a Worthington Industries company.
 - d. MarinoWARE.

e. Steel Network, Inc. (The).

- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal loads and transfer them to the primary structure, and as follows:
1. Minimum Base-Metal Thickness: Matching steel studs
 2. Flange Width: 1 inch plus the design gap for one-story structures.
- E. Drift Clips: Manufacturer's standard bypass or head clips, capable of isolating wall stud from upward and downward vertical displacement and lateral drift of primary structure through positive mechanical attachment to stud web and structure.

2.5 SOFFIT FRAMING

- A. Exterior Soffit Frame: Manufacturer's standard C-shaped steel sections, of web depths indicated, with stiffened flanges, and as follows:
1. Minimum Base-Metal Thickness: 0.0428 inch.
 2. Flange Width: 1-5/8 inches, minimum.

2.6 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
1. Supplementary framing.
 2. Bracing, bridging, and solid blocking.
 3. Web stiffeners.
 4. Anchor clips.
 5. End clips.
 6. Gusset plates.
 7. Stud kickers and knee braces.
 8. Joist hangers and end closures.
 9. Hole reinforcing plates.
 10. Backer plates.

2.7 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36, zinc coated by hot-dip process according to ASTM A 123.
- B. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318

greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.

- C. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated according to ICC-ES AC70, greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.
- D. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping, steel drill screws.
 - 1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- E. Welding Electrodes: Comply with AWS standards.

2.8 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035B.
- B. Shims: Load bearing, high-density multimonomer plastic, and nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.
- C. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

2.9 FABRICATION

- A. Fabricate cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
 - 1. Fabricate framing assemblies using jigs or templates.
 - 2. Cut framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, pneumatic pin fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by no fewer than three exposed screw threads.
 - 4. Fasten other materials to cold-formed steel framing by welding, bolting, pneumatic pin fastening, or screw fastening, according to Shop Drawings.

- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
 - 2. Squareness: Fabricate each cold-formed steel framing assembly to a maximum out-of-square tolerance of 1/8 inch.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine supporting substrates and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.
- C. Install sealer gaskets at the underside of wall bottom track or rim track and at the top of foundation wall or slab at stud or joist locations.

3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
 - D. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
 1. Cut framing members by sawing or shearing; do not torch cut.
 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
 - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
 - E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
 - F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
 - G. Install insulation, specified in Section 072100 "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
 - H. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
 - I. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
 1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
- 3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION
- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
 - B. Fasten both flanges of studs to top and bottom track unless otherwise indicated. Space studs as follows:
 1. Stud Spacing: 16 inches maximum.

- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
 - 1. Install single deep-leg deflection tracks and anchor to building structure.
 - 2. Connect vertical deflection clips to bypassing studs and anchor to building structure.
 - 3. Connect drift clips to cold-formed metal framing and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced vertically in rows indicated on Shop Drawings but not more than 48 inches apart. Fasten at each stud intersection.
 - 1. Top Bridging for Single Deflection Track: Install row of horizontal bridging within 12 inches of single deflection track. Install a combination of bridging and stud or stud-track solid blocking of width and thickness matching studs, secured to stud webs or flanges.
 - a. Install solid blocking at centers indicated on Shop Drawings.
 - 2. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs.
 - 3. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, and fasteners, to provide a complete and stable wall-framing system.

3.5 JOIST AND SOFFIT INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Install joists bearing on supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
 - 1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches.
 - 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.
- C. Space joists not more than 2 inches from abutting walls, and as follows:
 - 1. Joist Spacing: 16 inches.

- D. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.
- E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.
 - 1. Install web stiffeners to transfer axial loads of walls above.
- F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
 - 1. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- G. Secure joists to load-bearing interior walls to prevent lateral movement of bottom flange.
- H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

3.6 FIELD QUALITY CONTROL

- A. Inspection: Owner will engage a qualified inspection agency to perform inspections.
- B. Field and shop welds will be subject to inspection.
- C. Remove and replace work that does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.7 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

This page intentionally left blank

**SECTION 055100
METAL STAIRS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prefabricated stairs.
- B. Structural steel stair framing and supports.
- C. Handrails and guards.

1.02 REFERENCE STANDARDS

- A. AISC 201 - AISC Certification Program for Structural Steel Fabricators, Standard for Steel Building Structures; 2006.
- B. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- C. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.
- D. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- E. NAAMM AMP 510 - Metal Stairs Manual; 1992.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide _____.
- C. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
 - 1. Include the design engineer's seal and signature on each sheet of shop drawings.
- D. Design Data: As required by authorities having jurisdiction.
- E. Fabricator's Qualification Statement: Provide documentation showing steel fabricator is certified under AISC 201.

1.04 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in Florida, or personnel under direct supervision of such an engineer.
- B. Fabricator Qualifications:
 - 1. A qualified steel fabricator that is certified by the American Institute for Steel Construction (AISC) under AISC 201.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Prefabricated Metal Stairs:
 - 1. Lapeyre Stair, Inc: www.lapeyrestair.com/#sle.
 - 2. Substitutions: See Section 016000 - Product Requirements.

2.02 METAL STAIRS - GENERAL

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
 - 1. Regulatory Requirements: Provide stairs and railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
 - 2. Structural Design: Provide complete stair and railing assemblies that comply with the applicable local code.

3. Dimensions: As indicated on drawings.
 4. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
 5. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
 6. Separate dissimilar metals using paint or permanent tape.
- B. Metal Jointing and Finish Quality Levels:
1. Service: Exposed joints tight with face surfaces aligned; underside of stair not covered by soffit is not considered exposed to view.
 - a. Welded Joints: Welded on back side wherever possible.
 - b. Welds Exposed to View: Ground smooth; not required to be flush.
 - c. Bolts Exposed to View: Countersunk flat or oval head bolts; no exposed nuts or screw threads.
 - d. Metal Surfaces to be Painted: Sanded smooth, suitable for satin or matte finish.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

2.03 PREFABRICATED STAIRS

- A. Alternating Tread Stairs: Welded metal unit; factory fabricated to the greatest degree possible.
1. Design Requirements:
 - a. Stair Load Capacity: Support the following without exceeding the allowable working stress of the material.
 - 1) Single Point Load: 1000 pounds.
 - 2) Distributed Load: 100 pounds per square foot.
 - b. Guardrail and Handrail Capacity: Support the following without exceeding the allowable working stress of the material.
 - 1) Single Point Load: 200 pounds.
 - 2) Distributed Load: 50 pounds per linear foot.
 - c. Support the following without exceeding the allowable working stress of the material.
 - 1) Single Point Load: 1000 pounds.
 - 2) Distributed Load: 100 pounds per square foot.
 2. Materials: Aluminum; ASTM B221 (ASTM B221M) 6063 alloy T52 temper.
 - a. Stair Angle: 68 degrees,
 - b. Components: Manufacturer's standard handrails, guardrails, non-skid treads and stringers.
 - c. Finish: Natural aluminum.
 - d. Accessories: Manufacturer's standard foot divider with rubber bumper strip.
 3. Manufacturers:
 - a. Lapeyre Stair, Inc; Alternating Tread Stair: www.lapeyrestair.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.04 HANDRAILS AND GUARDS

2.05 SHOP FINISHING

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. When field welding is required, clean and strip primed steel items to bare metal.
- B. Supply items required to be embedded in masonry with setting templates.

3.03 INSTALLATION

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- D. Provide welded field joints where specifically indicated on drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
- F. Obtain approval prior to site cutting or creating adjustments not scheduled.
- G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

END OF SECTION 055100

This page intentionally left blank

**SECTION 055133
METAL LADDERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Prefabricated ladders.

1.02 RELATED REQUIREMENTS

- A. Section 055213 - Pipe and Tube Railings.
- B. Section 099113 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ANSI A14.3 - American National Standard for Ladders -- Fixed -- Safety Requirements; 2018.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- D. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- F. ASTM A283/A283M - Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates; 2013.
- G. ASTM A307 - Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60 000 PSI Tensile Strength; 2021.
- H. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- I. ASTM B211/B211M - Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire; 2019.
- J. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination; 2012.
- K. AWS D1.1/D1.1M - Structural Welding Code - Steel; 2015.
- L. IAS AC172 - Accreditation Criteria for Fabricator Inspection Programs for Structural Steel; International Accreditation Service, Inc.; 2011.
- M. SSPC-Paint 15 - Steel Joist Shop Primer/Metal Building Primer; 2004.
- N. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.
- O. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings:
 - 1. Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories. Include erection drawings, elevations, and details where applicable.
 - 2. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.

1.05 QUALITY ASSURANCE

- A. Design _____ under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in Florida.
- B. Fabricator Qualifications: A qualified steel fabricator that is accredited by IAS AC172.

PART 2 PRODUCTS

2.01 MATERIALS - STEEL

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A501/A501M hot-formed structural tubing.
- C. Plates: ASTM A283/A283M.
- D. Pipe: ASTM A53/A53M, Grade B Schedule 40, hot-dip galvanized finish.
- E. Mechanical Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- F. Bolts, Nuts, and Washers: ASTM A307, galvanized to ASTM A153/A153M where connecting galvanized components.
- G. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.
- H. Shop and Touch-Up Primer: SSPC-Paint 15, complying with VOC limitations of authorities having jurisdiction.
- I. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20, Type I - Inorganic, complying with VOC limitations of authorities having jurisdiction.

2.02 FABRICATION

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Continuously seal joined members by intermittent welds and plastic filler.
- D. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- E. Exposed Mechanical Fastenings: Flush countersunk screws or bolts; unobtrusively located; consistent with design of component, except where specifically noted otherwise.
- F. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

2.03 FABRICATED LADDERS

- A. Ladders: Galvanized steel; in compliance with ANSI A14.3; with mounting brackets and attachments; prime paint finish.
 - 1. Side Rails: 3/8 by 2 inches members spaced at 20 inches.
 - 2. Rungs: One inch diameter solid round bar spaced 12 inches on center.
 - 3. Space rungs 7 inches from wall surface.

2.04 PREFABRICATED LADDERS

- A. Prefabricated Ladder: Welded metal unit complying with ANSI A14.3; factory fabricated to greatest degree practical and in the largest components possible.
 - 1. Basis of Design:
 - a. Manufacturer: Okeeffe's Inc.
 - 2. Components: Manufacturer's standard rails, rungs, treads, handrails. returns, platforms and safety devices complying with the requirements of the MATERIALS article of this section.
 - 3. Materials: Aluminum; ASTM B211/B211M 6063 alloy, T52 temper.
 - 4. Finish: Mill finish aluminum.
 - 5. Mounting Brackets:
 - a. Provide all necessary mounting brackets to mount ladder to wall with a minimum offset of 7" from face of wall to centerline of ladder.
 - b. Provide off-floor mounting bracket to elevate base of ladder from ground plane.
 - 6. Manufacturers:
 - a. Industrial Ladder & Scaffolding, Inc.; _____: www.anyladder.com/#sle.

- b. O'Keeffe's Inc; Model 500: www.okeeffes.com/#sle.
- c. Precision Ladders, LLC; Fixed Aluminium Wall Ladder:
www.precisionladders.com/#sle.

2.05 FINISHES - STEEL

- A. Prime paint steel items.
- B. Prepare surfaces to be primed in accordance with SSPC-SP2.
- C. Prime Painting: One coat.
- D. Galvanizing of Structural Steel Members: Galvanize after fabrication to ASTM A123/A123M requirements. Provide minimum 1.7 oz/sq ft galvanized coating.
- E. Galvanizing of Non-structural Items: Galvanize after fabrication to ASTM A123/A123M requirements.

2.06 FABRICATION TOLERANCES

- A. Squareness: 1/8 inch maximum difference in diagonal measurements.
- B. Maximum Offset Between Faces: 1/16 inch.
- C. Maximum Misalignment of Adjacent Members: 1/16 inch.
- D. Maximum Bow: 1/8 inch in 48 inches.
- E. Maximum Deviation From Plane: 1/16 inch in 48 inches.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Supply setting templates to the appropriate entities for steel items required to be cast into concrete or embedded in masonry.

3.03 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Obtain approval prior to site cutting or making adjustments not scheduled.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 055133

This page intentionally left blank

**SECTION 055213
PIPE AND TUBE RAILINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Stair railings and guardrails.
- B. Free-standing railings at ramps.
- C. Free-standing railings at steps.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Placement of anchors in concrete.
- B. Section 042000 - Unit Masonry: Placement of anchors in masonry.
- C. Section 055100 - Metal Stairs: Handrails other than those specified in this section.
- D. Section 099113 - Exterior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless; 2012.
- C. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- D. ASTM A204/A240M - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strips for pressure vessels and for general applications; 2015b.
- E. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing; 2014.
- F. ASTM E935 - Standard Test Methods for Performance of Permanent Metal Railing Systems and Rails for Buildings; 2021.
- G. ASTM E985 - Standard Specification for Permanent Metal Railing Systems and Rails for Buildings; 2000 (Reapproved 2006).
- H. SSPC-Paint 20 - Zinc-Rich Coating (Type I - Inorganic, and Type II - Organic); 2019.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, anchorage, size and type of fasteners, and accessories.

1.05 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in Florida, or personnel under direct supervision of such an engineer.
- B. Welder Qualifications: Show certification of welders employed on the Work, verifying AWS qualification within the previous 12 months.
- C. Fabricator Qualifications:
 - 1. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

PART 2 PRODUCTS

2.01 RAILINGS - GENERAL REQUIREMENTS

- A. Design, fabricate, and test railing assemblies in accordance with the most stringent requirements of ASTM E985 and applicable local code.

- B. Distributed Loads: Design railing assembly, wall rails, and attachments to resist distributed force of 75 pounds per linear foot applied to the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
- C. Concentrated Loads: Design railing assembly, wall rails, and attachments to resist a concentrated force of 200 pounds applied at any point on the top of the assembly and in any direction, without damage or permanent set. Test in accordance with ASTM E935
- D. Dimensions: See drawings for configurations and heights.
- E. Provide anchors and other components as required to attach to structure, made of same materials as railing components unless otherwise indicated; where exposed fasteners are unavoidable provide flush countersunk fasteners.
 - 1. For anchorage to concrete, provide inserts to be cast into concrete, for welding anchors.
 - 2. For anchorage to masonry, provide brackets to be embedded in masonry, for welding anchors.

2.02 EXTERIOR HANDRAILS AND GUARDRAILS

2.03 HAND RAIL SYSTEM

- A. Galvanized Steel Tube: ASTM A500/A500M, Grade B Cold formed structural tubing.
- B. Welding Fittings: Factory- or shop-welded from matching pipe or tube; seams continuously welded; joints and seams ground smooth.
- C. Exposed Fasteners: No exposed bolts or screws.
- D. Galvanizing: In accordance with requirements of ASTM A123/A123M.
 - 1. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type II - Organic.
- E. Finish: Factory or shop primed, field painted.

2.04 FABRICATION

- A. Accurately form components to suit specific project conditions and for proper connection to building structure.
- B. Fit and shop assemble components in largest practical sizes for delivery to site.
- C. Fabricate components with joints tightly fitted and secured. Provide spigots and sleeves to accommodate site assembly and installation.
- D. Welded Joints:
 - 1. Exterior Components: Continuously seal joined pieces by intermittent welds and plastic filler. Drill condensate drainage holes at bottom of members at locations that will not encourage water intrusion.
 - 2. Interior Components: Continuously seal joined pieces by intermittent welds and plastic filler.
 - 3. Grind exposed joints flush and smooth with adjacent finish surface. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

3.02 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply items required to be cast into concrete or embedded in masonry with setting templates, for installation as work of other sections.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

- B. Install components plumb and level, accurately fitted, free from distortion or defects, with tight joints.
- C. Install railings in compliance with ADA Standards for accessible design at applicable locations.
- D. Anchor railings securely to structure.
- E. Field weld anchors as indicated on drawings. Touch-up welds with primer. Grind welds smooth.

3.04 TOLERANCES

- A. Maximum Variation From Plumb: 1/4 inch per floor level, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.
- C. Maximum Out-of-Position: 1/4 inch.

END OF SECTION 055213

This page intentionally left blank

**SECTION 061000
ROUGH CARPENTRY**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-structural dimension lumber framing.
- B. Concealed wood blocking, nailers, and supports.
- C. Miscellaneous wood nailers, furring, and grounds.

1.02 REFERENCE STANDARDS

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- B. AWPA U1 - Use Category System: User Specification for Treated Wood; 2012.
- C. PS 20 - American Softwood Lumber Standard; 2010.
- D. SPIB (GR) - Grading Rules; 2014.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on insulated sheathing, wood preservative materials, and application instructions.
- C. Manufacturer's Certificate: Certify that wood products supplied for rough carpentry meet or exceed specified requirements.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. General: Cover wood products to protect against moisture. Support stacked products to prevent deformation and to allow air circulation.
- B. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. Dimension Lumber: Comply with PS 20 and requirements of specified grading agencies.
 - 1. Species: Southern Pine, unless otherwise indicated.
 - 2. Grading Agency: Any grading agency whose rules are approved by the Board of Review, American Lumber Standard Committee (www.alsc.org) and who provides grading service for the species and grade specified; provide lumber stamped with grade mark unless otherwise indicated.
- B. Lumber fabricated from old growth timber is not permitted.

2.02 DIMENSION LUMBER FOR CONCEALED APPLICATIONS

- A. Grading Agency: Southern Pine Inspection Bureau, Inc; SPIB (GR).
- B. Sizes: Nominal sizes as indicated on drawings, S4S.
- C. Moisture Content: S-dry or MC19.
- D. Miscellaneous Framing, Blocking, Nailers, Grounds, and Furring:
 - 1. Lumber: S4S, No. 2 or Standard Grade.
 - 2. Boards: Standard or No. 3.

2.03 ACCESSORIES

- A. Fasteners and Anchors:
 - 1. Metal and Finish: Hot-dipped galvanized steel complying with ASTM A153/A153M for high humidity and preservative-treated wood locations, unfinished steel elsewhere.
 - 2. Anchors: Toggle bolt type for anchorage to hollow masonry.

2.04 FACTORY WOOD TREATMENT

- A. Treated Lumber and Plywood: Comply with requirements of AWP A U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.
 - 1. Preservative-Treated Wood: Provide lumber and plywood marked or stamped by an ALSC-accredited testing agency, certifying level and type of treatment in accordance with AWP A standards.

PART 3 EXECUTION

3.01 INSTALLATION - GENERAL

- A. Select material sizes to minimize waste.
- B. Reuse scrap to the greatest extent possible; clearly separate scrap for use on site as accessory components, including: shims, bracing, and blocking.
- C. Where treated wood is used on interior, provide temporary ventilation during and immediately after installation sufficient to remove indoor air contaminants.

3.02 BLOCKING, NAILERS, AND SUPPORTS

- A. Provide framing and blocking members as indicated or as required to support finishes, fixtures, specialty items, and trim.
- B. In walls, provide blocking attached to studs as backing and support for wall-mounted items, unless item can be securely fastened to two or more studs or other method of support is explicitly indicated.
- C. Where ceiling-mounting is indicated, provide blocking and supplementary supports above ceiling, unless other method of support is explicitly indicated.
- D. Provide the following specific non-structural framing and blocking:
 - 1. Cabinets and shelf supports.
 - 2. Wall brackets.
 - 3. Grab bars.
 - 4. Chalkboards and marker board.
 - 5. Miscellaneous blocking.

3.03 TOLERANCES

- A. Framing Members: 1/4 inch from true position, maximum.
- B. Variation from Plane (Other than Floors): 1/4 inch in 10 feet maximum, and 1/4 inch in 30 feet maximum.

3.04 CLEANING

- A. Waste Disposal: Comply with the requirements of Section 017419 - Construction Waste Management and Disposal.
 - 1. Comply with applicable regulations.
 - 2. Do not burn scrap on project site.
 - 3. Do not burn scraps that have been pressure treated.
 - 4. Do not send materials treated with pentachlorophenol, CCA, or ACA to co-generation facilities or "waste-to-energy" facilities.
- B. Do not leave any wood, shavings, sawdust, etc. on the ground or buried in fill.
- C. Prevent sawdust and wood shavings from entering the storm drainage system.

END OF SECTION 061000

**SECTION 064100
ARCHITECTURAL WOOD CASEWORK**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Specially fabricated cabinet units.
- B. Hardware.

1.02 RELATED REQUIREMENTS

- A. Section 016116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 123600 - Countertops.

1.03 REFERENCE STANDARDS

- A. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1; 2016, with Errata (2017).
- B. BHMA A156.9 - American National Standard for Cabinet Hardware; 2010.
- C. HPVA HP-1 - American National Standard for Hardwood and Decorative Plywood; 2024.
- D. NEMA LD 3 - High-Pressure Decorative Laminates; 2005.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting not less than one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate materials, component profiles, fastening methods, jointing details, and accessories.
 - 1. Scale of Drawings: 1/4" to , minimum.
- C. Product Data: Provide data for hardware accessories.

1.06 QUALITY ASSURANCE

- A. Fabricator Qualifications: Company specializing in fabricating the products specified in this section with minimum five years of documented experience.
 - 1. Company with at least one project in the past 5 years with value of woodwork within 20 percent of cost of woodwork for this Project.
 - 2. Single Source Responsibility: Provide and install this work from single fabricator.

1.07 MOCK-UPS

- A. Provide mock-up of typical base cabinet, wall cabinet, and countertop, including hardware, finishes, and plumbing accessories.
- B. Locate where directed.
- C. Mock-up may remain as part of the work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect units from moisture damage.

1.09 FIELD CONDITIONS

- A. During and after installation of custom cabinets, maintain temperature and humidity conditions in building spaces at same levels planned for occupancy.

PART 2 PRODUCTS

2.01 CABINETS

- A. Quality Standard: Custom Grade, in accordance with AWI/AWMAC/WI (AWS), unless noted otherwise.
- B. Cabinets:
 - 1. Finish - Exposed Exterior Surfaces: Decorative laminate.
 - 2. Finish - Exposed Interior Surfaces: Decorative laminate.
 - 3. Finish - Semi-Exposed Surfaces: Decorative laminate.
 - 4. Finish - Concealed Surfaces: Manufacturer's option.
 - 5. Door and Drawer Front Edge Profiles: Square edge with thin applied band.
 - 6. Casework Construction Type: Type A - Frameless.
 - 7. Interface Style for Cabinet and Door: Style 1 - Overlay; flush overlay.
 - 8. Layout for Cabinet and Door Fronts: Flush panel.
 - a. Premium Grade:
 - 1) Provide vertical run and match for doors, drawer fronts and false fronts within each cabinet unit.
 - 9. Drawer Construction Technique: Dovetail joints.

2.02 LAMINATE MATERIALS

- A. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications.
- B. Provide specific types as indicated.
 - 1. Horizontal Surfaces: HGS, 0.048 inch nominal thickness, through color, colors as indicated, finish as selected.
 - 2. Vertical Surfaces: VGS, 0.028 inch nominal thickness, through color, colors as indicated, finish as selected.
 - 3. Laminate Backer: BKL, 0.020 inch nominal thickness, undecorated; for application to concealed backside of panels faced with high pressure decorative laminate.
 - 4. Backer at concealed surfaces: hardwood plywood; particle board is not permissible.

2.03 COUNTERTOPS

- A. Countertops: See Section 123600.

2.04 ACCESSORIES

- A. Adhesive: Type recommended by fabricator to suit application.
- B. Fasteners: Size and type to suit application.
- C. Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; galvanized or chrome-plated finish in concealed locations and stainless steel or chrome-plated finish in exposed locations.
- D. Concealed Joint Fasteners: Threaded steel.
- E. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

2.05 HARDWARE

- A. Hardware: BHMA A156.9, types as recommended by fabricator for quality grade specified.
- B. Adjustable Shelf Supports: Standard side-mounted system using recessed metal shelf standards or multiple holes for pin supports and coordinated self rests, satin chrome finish, for nominal 1 inch spacing adjustments.
- C. Fixed Specialty Shelf Supports:
 - 1. Material: Steel.
 - 2. Product: L80-7 double slotted stanchion system or equal.
 - 3. Manufacturer: Southwest Solutions Group.
- D. Fixed Specialty Workstation and Countertop Brackets:
 - 1. Material: Steel.

2. Finish: Manufacturer's standard, factory-applied powder coat.
3. Color: Selected by Architect from manufacturer's standard range.
4. Manufacturers:
 - a. A&M Hardware, Inc ; Concealed Brackets: <http://www.aandmhardware.com/#sle>.
 - b. Centerline Brackets: <http://www.centerlinebrackets.com>.
 - c. Substitutions: See Section 016000 - Product Requirements.
- E. Drawer and Door Pulls:
 1. Product: Cube pull manufactured by Hafele.
 2. Finish: Brushed Nickel
 3. Size: 5 inches center-to-center.
- F. Drawer Slides:
 1. Type: Full extension.
 2. Static Load Capacity: Heavy Duty grade.
 3. Mounting: Side mounted.
 4. Stops: Integral type.
 5. Features: Provide self closing/stay closed type.
- G. Hinges: European style concealed self-closing type, steel with satin finish.

2.06 FABRICATION

- A. Assembly: Shop assemble cabinets for delivery to site in units easily handled and to permit passage through building openings.
- B. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- C. Fitting: When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide matching trim for scribing and site cutting.
- D. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline; secure with concealed fasteners. Slightly bevel arises. Locate counter butt joints minimum 2 feet from sink cut-outs.
 1. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.
 2. Cap exposed plastic laminate finish edges with material of same finish and pattern.
- E. Mechanically fasten back splash to countertops as recommended by laminate manufacturer at 16 inches on center.
- F. Provide cutouts for plumbing fixtures. Verify locations of cutouts from on-site dimensions. Prime paint cut edges.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify adequacy of backing and support framing.
- B. Verify location and sizes of utility rough-in associated with work of this section.

3.02 INSTALLATION

- A. Set and secure custom cabinets in place, assuring that they are rigid, plumb, and level.
- B. Use fixture attachments in concealed locations for wall mounted components.
- C. Use concealed joint fasteners to align and secure adjoining cabinet units.
- D. Carefully scribe casework abutting other components, with maximum gaps of 1/32 inch. Do not use additional overlay trim for this purpose.
- E. Secure cabinets to floor using appropriate angles and anchorages.
- F. Countersink anchorage devices at exposed locations. Conceal with solid wood plugs of species to match surrounding wood; finish flush with surrounding surfaces.

3.03 ADJUSTING

- A. Adjust installed work.
- B. Adjust moving or operating parts to function smoothly and correctly.

3.04 CLEANING

- A. Clean casework, counters, shelves, hardware, fittings, and fixtures.

END OF SECTION 064100

**SECTION 070553
FIRE AND SMOKE ASSEMBLY IDENTIFICATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Identification markings for fire and smoke rated partitions, and fire rated walls.

1.02 RELATED REQUIREMENTS

- A. Section 099123 - Interior Painting: Paint finish.

1.03 REFERENCE STANDARDS

- A. Florida Building Code, Building (FBC-B), 5th Edition.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of marking, indicating font, foreground and background colors, wording, and overall dimensions.
- C. Schedule: Completely define scope of proposed marking. Indicate location of affected walls and partitions, and number of markings.

1.05 FIELD CONDITIONS

- A. Do not install painted markings when ambient temperature is lower than recommended by coating manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Partition Identification Labels:
 - 1. Fire Wall Signs, Inc: www.firewallsigns.com.
 - 2. Safety Supply Warehouse, Inc: www.safetysupplywarehouse.com.

2.02 FIRE AND SMOKE ASSEMBLY IDENTIFICATION

- A. Regulatory Requirements: Comply with "Markings and Identification" requirements of "Fire-Resistance Ratings for Fire Tests" chapter of the Florida Building Code (FBC-B).
- B. Adhered Fire and Smoke Assembly Identification Signs: Printed vinyl sign with factory applied adhesive backing.
- C. Languages: Provide all markings in English.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install adhered markings in accordance with manufacturer's instructions.
- B. Install markings as required by Florida Building Code (FBC-B)
- C. Install neatly, with horizontal edges level.
- D. Protect from damage until Substantial Completion; repair or replace damaged markings.

END OF SECTION 070553

This page intentionally left blank

**SECTION 072100
THERMAL INSULATION**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Board insulation at exterior wall behind metal siding wall finish.
- B. Batt insulation in exterior wall construction.
- C. Batt insulation for filling perimeter window and door shim spaces and crevices in exterior wall and roof.

1.02 RELATED REQUIREMENTS

- A. Section 072700 - Air Barriers: Separate air barrier materials.

1.03 REFERENCE STANDARDS

- A. ASTM C553 - Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications; 2013 (Reapproved 2019).
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
- D. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Insulation Materials and Facings; 2019.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- F. ASTM E136 - Standard Test Method for Behavior of Materials in a Vertical Tube Furnace At 750 Degrees C; 2012.
- G. ASTM E1414/E1414M - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum; 2021a.
- H. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components; 2012.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.
- C. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.

1.05 FIELD CONDITIONS

- A. Do not install insulation adhesives when temperature or weather conditions are detrimental to successful installation.

PART 2 PRODUCTS

2.01 APPLICATIONS

- A. Insulation Over Metal Stud Framed Walls, Continuous: Polyisocyanurate board.
- B. Insulation in Metal Framed Walls: Batt insulation with separate vapor retarder.
- C. Insulation Above Lay-In Acoustical Ceilings: Batt insulation with no vapor retarder.

2.02 FOAM BOARD INSULATION MATERIALS

- A. Polyisocyanurate (ISO) Board Insulation: Rigid cellular foam, complying with ASTM C1289.
 - 1. Classifications:
 - a. Type II: Faced with either organic felt facers or glass fiber mat facers on both major surfaces of the core foam.

- 1) Class 1 - Faced with glass fiber reinforced cellulosic felt facers on both major surfaces of core foam.
- 2) Compressive Strength: Classes 1-2-3, Grade 1 - 16 psi (110 kPa), minimum.
- 3) Thermal Resistance, R-value: At 1-1/2 inch thick; Class 1, Grades 1-2-3 - 8.4 (1.48), minimum, at 75 degrees F.
2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
4. Complies with fire resistance requirements indicated on drawings as part of an exterior non-load-bearing exterior wall assembly when tested in accordance with NFPA 285.
5. Board Size: 48 inch by 96 inch.
6. Board Thickness: 1.75 inch.
7. Products:
 - a. Atlas Roofing Corporation; EnergyShield CGF PRO: www.atlasroofing.com/#sle.

2.03 BATT INSULATION MATERIALS

- A. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.
 1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
 2. Smoke Developed Index: 450 or less, when tested in accordance with ASTM E84.
 3. Combustibility: Non-combustible, when tested in accordance with ASTM E136, except for facing, if any.
 4. Facing: Unfaced.
 5. Products:
 - a. CertainTeed Corporation; Insulpure: www.certainteed.com/#sle.
 - b. Johns Manville; Cavity-Shield: www.jm.com/#sle.
 - c. Owens Corning Corporation; EcoTouch PINK FIBERGLAS Insulation: www.ocbuildingspec.com/#sle.

2.04 ACCESSORIES

- A. Tape: Reinforced polyethylene film with acrylic pressure sensitive adhesive.
 1. Application: Sealing of interior circular penetrations, such as pipes or cables.
 2. Width: Are required for application.
- B. Insulation Fasteners: Lengths of unfinished, 13 gauge, 0.072 inch high carbon spring steel with chisel or mitered tips, held in place by tension, length to suit insulation thickness and substrate, capable of securely supporting insulation in place.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

3.02 BOARD INSTALLATION AT EXTERIOR WALLS

- A. Adhere 6 inches wide strip of polyethylene sheet over expansion joints with double beads of adhesive each side of joint.
 1. Tape seal joints between sheets.
- B. Install boards horizontally on walls.
- C. Extend boards over expansion joints, unbonded to wall on one side of joint.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

3.03 BATT INSTALLATION

- A. Install insulation and vapor retarder in accordance with manufacturer's instructions.

- B. Install in exterior wall and roof spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.
- E. At metal framing, place vapor retarder on warm side of insulation; lap and seal sheet retarder joints over face of member
- F. Tape seal tears or cuts in vapor retarder.
- G. Extend vapor retarder tightly to full perimeter of adjacent window and door frames and other items interrupting the plane of the membrane; tape seal in place.

3.04 PROTECTION

- A. Do not permit installed insulation to be damaged prior to its concealment.

END OF SECTION 072100

This page intentionally left blank

**SECTION 072500
WEATHER BARRIERS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, and joints around frames of openings in exterior walls.

1.02 DEFINITIONS

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.
- C. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
 - 1. Water Vapor Permeance: For purposes of conversion, $57.2 \text{ ng}/(\text{Pa s sq m}) = 1 \text{ perm}$.
- D. Water-Resistive Barrier: Water-shedding barrier made of material that is moisture resistant, to the degree specified.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics.

1.04 FIELD CONDITIONS

- A. Maintain temperature and humidity recommended by the materials manufacturers before, during and after installation.

PART 2 PRODUCTS

2.01 WEATHER BARRIER ASSEMBLIES

- A. Air Barrier:
 - 1. On outside surface of sheathing of exterior walls use air barrier coating.

2.02 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)

- A. Air Barrier, Fluid Applied: Vapor permeable, elastomeric waterproofing.
 - 1. Air Barrier Coating:
 - a. Dry Film Thickness (DFT): 10 mil, 0.010 inch, minimum.
 - b. Air Permeance: 0.001 cubic feet per minute per square foot, maximum, when tested in accordance with ASTM E2178.
 - c. Water Vapor Permeance: 18 perms, minimum, when tested in accordance with ASTM E96/E96M, Procedure B.
 - d. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to six months of weather exposure after application.
 - e. Elongation: 300 percent, minimum, when tested in accordance with ASTM D412.
 - f. Surface Burning Characteristics: Flame spread index of 25 or less, smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 - g. Complies with NFPA 285 wall assembly requirements.
 - h. Nail Sealability: Pass, when tested in accordance with ASTM D1970/D1970M.
 - i. VOC Content: 100 g per L or less.
 - j. Basis of design products:
 - 1) Dow Chemical Company; DOWSIL DefendAir 200: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - 2) Henry Company; Air-Bloc 17MR: www.henry.com/#sle.

- 3) PROSOCO, Inc; R-GUARD Spray Wrap MVP: www.prosoco.com/r-guard/#sle.

2.03 ACCESSORIES

- A. Sealants, Tapes, and Accessories for Sealing Weather Barrier and Sealing Weather Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
- B. Pre-formed Transition Membrane: Semi-rigid silicone or polyester composition, tapered edges, tear resistant.
 - 1. Manufacturers:
 - a. Dow Chemical Company; DOWSIL Silicone Transition Strip and System: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - b. Tremco Commercial Sealants & Waterproofing; ProGlaze ETA System 1: www.tremcosealants.com/#sle.
- C. Liquid Flashing: One part, fast curing, non-sag, gun grade, trowelable liquid flashing.
 - 1. Manufacturers:
 - a. Dow Chemical Company; DOWSIL 778 Silicone Liquid Flashing: consumer.dow.com/en-us/industry/ind-building-construction.html/#sle.
 - b. Momentive Performance Materials, Inc/GE Construction Sealants; Elemax 5000 Liquid-Applied Flashing: www.siliconeforbuilding.com/#sle.
 - c. Polyglass USA, Inc; PolyFlash 1C One Part Flashing compound: www.polyglass.us/#sle.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces and conditions are ready to accept the work of this section.

3.02 PREPARATION

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.
- B. Clean and prime substrate surfaces to receive adhesives in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install materials in accordance with manufacturer's instructions.
- B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Apply sealants and adhesives within recommended application temperature ranges. Consult manufacturer if temperature is out of this range.
- D. Coatings:
 - 1. Prepare substrate in manner recommended by coating manufacturer; treat joints in substrate and between dissimilar materials as recommended by manufacturer.
 - 2. Use flashing to seal to adjacent construction and to bridge joints.
- E. Openings and Penetrations in Exterior Weather Barriers:
 - 1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
 - 2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
 - 3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
 - 4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
 - 5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.

6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

3.04 FIELD QUALITY CONTROL

- A. See Section 014000 - Quality Requirements, for additional requirements.
- B. Coordination of ABAA Tests and Inspections:
 1. Provide testing and inspection required by ABAA QAP.
 2. Notify ABAA in writing of schedule for air barrier work, and allow adequate time for testing and inspection.
 3. Cooperate with ABAA testing agency.
 4. Allow access to air barrier work areas and staging.
 5. Do not cover air barrier work until tested, inspected, and accepted.
- C. Obtain approval of installation procedures by the weather barrier manufacturer based on a mock-up installed in place, prior to proceeding with remainder of installation.
- D. Take digital photographs of each portion of the installation prior to covering up.

3.05 PROTECTION

- A. Do not leave materials exposed to weather longer than recommended by manufacturer.

END OF SECTION 072500

This page intentionally left blank

**SECTION 074113
METAL ROOF PANELS - PETERSEN ALUMINUM**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Preformed aluminum panels.
- B. Attachment system.

1.02 REFERENCE STANDARDS

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels; 2013.
- B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021.
- C. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection; 2013.
- D. ASTM D4869/D4869M - Standard Specification for Asphalt-Saturated Organic Felt Underlayment Used in Steep Slope Roofing; 2015.
- E. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- F. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference; 2005 (Reapproved 2017).
- G. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference; 2011 (Reapproved 2018).
- H. ASTM E1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems; 2016.
- I. ICC-ES AC188 - Acceptance Criteria for Roof Underlayments; 2012.
- J. UL 580 - Standard for Tests for Uplift Resistance of Roof Assemblies; Current Edition, Including All Revisions.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
- C. Shop Drawings: Indicate layouts of roof panels, details of edge and penetration conditions, spacing and type of connections, flashings, underlayments, and special conditions.
 - 1. Show work to be field fabricated or field assembled.
 - 2. Include structural analysis signed and sealed by qualified structural engineer, indicating compliance of roofing system to specified loading conditions.
- D. Test Reports: Indicate compliance of metal roofing system with specified requirements.
- E. Installer's qualification statement.
- F. Specimen warranty.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section and with at least five years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least ten years of documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. See Section 017419 - Construction Waste Management and Disposal for packaging waste requirements.
- B. Provide strippable plastic protection on prefinished roofing panels for removal after installation.
- C. Store roofing panels on project site as recommended by manufacturer to minimize damage to panels prior to installation.

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Special Warranty: Provide 5-year warranty for weathertightness of roofing system, including agreement to repair or replace metal roof panels that fail to keep out water commencing on Date of Substantial Completion. Complete forms in Owner's name and register with warrantor.
- C. Finish Warranty: Provide 30-year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking. Complete forms in Owner's name and register with warrantor.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Architectural Metal Roof Panel Manufacturers:
 - 1. Basis of design: Petersen Aluminum Corporation; Tite-Loc Plus Panel: www.pac-clad.com/#sle.
- B. Metal Soffit Panel Manufacturers:
 - 1. Basis of design: Petersen Aluminum Corporation; Flush sof.

2.02 PERFORMANCE REQUIREMENTS

- A. Metal Roof Panels: Provide complete roofing assemblies, including roof panels, clips, fasteners, connectors, and miscellaneous accessories, tested for compliance with the following minimum standards:
 - 1. Structural Design Criteria: Provide panel assemblies designed to safely support design loads at support spacing indicated, with deflection not to exceed L/180 of span length (L) when tested in accordance with ASTM E1592.
 - 2. System Performance: Complete and weathertight; tested and approved in accordance with ASTM E1592.
 - 3. Air Infiltration: Maximum 0.06 cfm/sq ft at air pressure differential of 6.24 lbf/sq ft, when tested in accordance with ASTM E1680.
 - 4. Water Penetration: No water penetration when tested in accordance with procedures and recommended test pressures of ASTM E1646; perform test immediately following air infiltration test.
 - 5. Thermal Movement: Design system to accommodate without deformation anticipated thermal movement over ambient temperature range of 100 degrees F.

2.03 METAL ROOF PANELS

- A. Description: Provide complete engineered system complying with specified requirements and capable of remaining weathertight while withstanding anticipated movement of substrate and thermally induced movement of roofing system.
- B. Metal Panels: Preformed panels with factory-applied finish.
 - 1. Aluminum Panels:
 - a. Alloy and Temper: Aluminum complying with ASTM B209/B209M; temper as required for forming.
 - b. Thickness: Minimum 18 gauge, 0.040 inch.
 - 2. Profile: Standing seam, with minimum 2-inch seam height; concealed fastener system for field seaming with special tool.
 - 3. Texture: smooth panel finish with striations.

4. Length: Maximum possible length to minimize lapped joints. Where lapped joints are unavoidable, space laps so each sheet spans over three or more supports.
 5. Width: Maximum panel coverage of 18 inches.
- C. Metal Soffit Panels:
1. Profile: Style as indicated, with venting not provided.
 2. Material: Aluminum.
 3. Class Fire Rated (ASTM E84), flame spread < 25, smoke developed < 50.
 4. Color: As indicated on drawings.

2.04 ATTACHMENT SYSTEM

- A. Concealed System: Provide manufacturer's standard stainless steel or nylon-coated aluminum concealed anchor clips designed for specific roofing system and engineered to meet performance requirements, including anticipated thermal movement.

2.05 FABRICATION

- A. Panels: Provide factory- or field-fabricated panels with applied finish and accessory items, using manufacturer's standard processes as required to achieve specified appearance and performance requirements.
- B. Joints: Provide captive gaskets, sealants, or separator strips at panel joints to ensure weathertight seals, eliminate metal-to-metal contact, and minimize noise from panel movements.

2.06 FINISHES

- A. Fluoropolymer Coil Coating System: Manufacturer's standard multi-coat metal coil-coating system complying with AAMA 2605, including at least 70 percent polyvinylidene fluoride (PVDF) resin, and at least 80 percent of coil-coated metal surfaces having minimum total dry film thickness (DFT) of 0.9 mil, 0.0009 inch; color and gloss to match sample.
- B. Touch-Up Materials: As recommended by coating manufacturer for field application.

2.07 ACCESSORIES

- A. Miscellaneous Sheet Metal Items: Provide flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, and equipment curbs of the same material, thickness, and finish as used for the roofing panels. Items completely concealed after installation may optionally be made of stainless steel.
1. Downspouts: Open face, rectangular profile.
- B. Rib and Ridge Closures: Provide prefabricated, close-fitting components of steel with corrosion-resistant finish or combination steel and closed-cell foam.
- C. Sealants:
1. Exposed Applications: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
 2. Concealed Applications: Noncuring butyl or tape sealant.
 3. Seams: Factory-applied, nonskinning, nondrying type.
- D. Thermal Insulation: Provide rigid type, faced with white, flexible, nondusting vapor retarder tested for maximum flame spread index of 75, in accordance with ASTM E84; for installation using spacer blocks.
1. Polyisocyanurate Insulation: Closed cell foam core manufactured on-line to fiber facers on each side (GRF). Approved for direct application to steel decks.
 2. Code compliance and testing:
 - a. ASTM C 1289 Type II, Class 1 Grade 2 (20 psi) or Grade 3 (25 psi).
 - b. Compressive Strength: 20 psi (ASTM D 1621).
 - c. Moisture vapor transmission: <1 perm (ASTM E 96).
 - d. Water Absorption: <1% volume (ASTM C 209).

- e. Flame Spread: <75 (ASTM E 84).
 - f. Smoke Developed: <450 (ASTM E 84).
- 3. Thickness: As indicated.
- E. Underlayment: Self-adhering rubber-modified asphalt sheet complying with ASTM D1970/D1970M; 40 mil total thickness; with strippable release film and polyolefin top surface with anti-skid coating.
 - 1. Minimum Requirements: Comply with requirements of ICC-ES AC188 for self-adhesive sheet.
 - 2. Self Sealability: Passing nail sealability test specified in ASTM D1970/D1970M.
 - 3. Low-Temperature Flexibility: Passing test specified in ASTM D1970/D1970M.
 - 4. Water Vapor Permeance: 0.067 perm, when tested in accordance with ASTM E96/E96M, Procedure A, desiccant method.
 - 5. Performance: Meet or exceed requirements for ASTM D226/D226M, Type II asphalt-saturated organic felt.
 - 6. Liquid Water Transmission: Passes ASTM D4869/D4869M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation of preformed metal roof panels until substrates are properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Coordinate roofing work with provisions for roof drainage, flashing, trim, penetrations, and other adjoining work to ensure completed roof will be free of leaks.
- B. Remove protective film from surface of roof panels immediately prior to installation; strip film carefully to avoid damage to prefinished surfaces.
- C. Separate dissimilar metals by applying a bituminous coating, self-adhering rubberized asphalt sheet, or other permanent method approved by metal roof panel manufacturer.
- D. At locations where metal will be in contact with wood or other absorbent material subject to wetting, seal joints with sealing compound and apply one coat of heavy-bodied bituminous paint.

3.03 INSTALLATION

- A. Install roofing system in accordance with approved shop drawings and metal roof panel manufacturer's instructions and recommendations, as applicable to specific project conditions; securely anchor components of roofing system in place, allowing for thermal and structural movement.
 - 1. Install roofing system with concealed clips and fasteners, except as otherwise recommended by manufacturer for specific circumstances.
 - 2. Minimize field cutting of panels. Where field cutting is required, use methods that will not distort panel profiles. Use of torches for field cutting is prohibited.
- B. Accessories: Install necessary components required for complete roofing assembly, including flashings, gutters, downspouts, trim, moldings, closure strips, preformed crickets, caps, equipment curbs, rib closures, ridge closures, and similar roof accessory items.
- C. Roof Panels: Install metal roof panels in accordance with manufacturer's installation instructions, minimizing transverse joints except at junction with penetrations.
 - 1. Form weathertight standing seams incorporating concealed clips using an automatic mechanical seaming device approved by panel manufacturer.
 - 2. Provide sealant tape or other approved joint sealer at lapped panel joints.

- 3. Install sealant or sealant tape at end laps and side joints as recommended by metal roof panel manufacturer.
- D. Insulation: Install insulation between roof covering and supporting members to present a neat appearance; fold, staple, and tape seams unless otherwise approved by Architect.

3.04 CLEANING

- A. Clean exposed sheet metal work at completion of installation. Remove grease and oil films, excess joint sealer, handling marks, and debris from installation, leaving work clean and unmarked, free from dents, creases, waves, scratch marks, or other damage to finish.

3.05 PROTECTION

- A. Do not permit storage of materials or roof traffic on installed roof panels. Provide temporary walkways or planks as necessary to avoid damage to completed work. Protect roofing until completion of project.
- B. Touch-up, repair, or replace damaged roof panels or accessories before Date of Substantial Completion.

END OF SECTION 074113

This page intentionally left blank

**SECTION 074213
METAL WALL PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured metal panels for walls, with insulation, related flashings, and accessory components.

1.02 RELATED REQUIREMENTS

- A. Section 072100 - Thermal Insulation.
- B. Section 072500 - Weather Barriers: Water-resistive barrier under wall panels.
- C. Section 079200 - Joint Sealants: Sealing joints between metal wall panel system and adjacent construction.

1.03 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- B. ASTM B209/B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2021.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate dimensions, layout, joints, construction details, methods of anchorage.
- B. Samples: Submit two samples of wall panel and soffit panel, 4 inch by 4 inch in size illustrating finish color, sheen, and texture.
- C. Installer's qualification statement.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in installing products of the type specified in this section with minimum three years of documented experience.

1.06 MOCK-UPS

- A. Construct mock-up, 6 feet long by 4 feet wide; include panel system, glazing, attachments to building frame, associated vapor retarder and air seal materials, weep drainage system, sealants and seals, related insulation in mock-up.
- B. Mock-up may remain as part of work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefabricated material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
- C. Prevent contact with materials that may cause discoloration or staining of products.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Correct defective work within a 30 year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
- C. Correct defective work within a thirty year period after Date of Substantial Completion, including defects in water tightness and integrity of seals for metal wall panels.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Wall Panels - Concealed Fasteners:
 - 1. Basis of design: Petersen Aluminum Corporation; Precision Series Box Rib Panels : www.pac-clad.com/#sle.

2.02 METAL WALL PANEL MATERIALS

- A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
 - 1. Provide exterior panels.
 - 2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
 - 3. Maximum Allowable Deflection of Panel: L/180 for length(L) of span.
 - 4. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
 - 5. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
 - 6. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
 - 7. Provide continuity of air barrier seal at building enclosure elements; see Section 072700.
- B. Exterior Wall Panels:
 - 1. Profile: Vertical; style as indicated.
 - 2. Side Seams: Double-interlocked, tight-fitting, sealed with continuous gaskets.
 - 3. Material: Precoated aluminum sheet, 18 gauge, 0.0403 inch minimum thickness.
 - 4. Panel Width: 12 inch.
 - 5. Panel Depth: 1 3/8 inch
 - 6. Flame Spread Testing: ASTM E84
 - 7. Color: As selected by Architect from manufacturer's full line.
 - 8. Texture: Ribbed.
- C. Exterior Fascia Panels:
 - 1. Composite wall panels (basis of design): PAC 3000 RS by Pac-Clad.
 - 2. Reveal joint: 1/2".
 - 3. Material: 4mm composite.
 - 4. Color: Silver
- D. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.
- E. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.
 - 1. Provide elite trim profiles for Horizontal Exterior Wall Panels as follows:
 - a. Endwall Channel
 - b. Reveal Extrusion
 - c. Base Extrusion
 - d. Head Extrusion
 - e. Jamb Extrusion
- F. Anchors: Stainless steel.

2.03 MATERIALS

- A. Precoated Aluminum Sheet: ASTM B209/B209M, 3105 alloy, O temper, smooth surface texture; continuous-coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

2.04 FINISHES

- A. Exposed Surface Finish: Panel manufacturer's standard polyvinylidene fluoride (PVDF) coating, top coat over epoxy primer.
- B. Panel Backside Finish: Panel manufacturer's standard siliconized polyester wash coat.

2.05 ACCESSORIES

- A. Cladding Support Clips: Thermally-broken, thermal spacer clips for support of cladding z-girts, angles, channels, and other framing.
 - 1. Thermal Spacer Clip: Pultruded glass fiber and thermoset polyester resin clip; 3/16 inch thick at top, base, and web.
 - 2. Clip Depth: As indicated on drawings.
- B. Concealed Sealants: Non-curing butyl sealant or tape sealant.
- C. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.
- D. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, stainless steel. Fastener cap same color as exterior panel.
- E. Field Touch-up Paint: As recommended by panel manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that building framing members are ready to receive panels.
- B. Verify that air barrier has been installed over substrate completely and correctly; see Section 072700.

3.02 INSTALLATION

- A. Install panels on walls and soffits in accordance with manufacturer's instructions.
- B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.
- C. Fasten panels to structural supports; aligned, level, and plumb.
- D. Locate joints over supports.
- E. Provide expansion joints where indicated.
- F. Use concealed fasteners unless otherwise approved by Architect.
- G. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

3.03 TOLERANCES

- A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.
- B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.

3.04 CLEANING

- A. Remove site cuttings from finish surfaces.
- B. Clean and wash prefinished surfaces with mild soap and water; rinse with clean water.

END OF SECTION 074213

This page intentionally left blank

SECTION 075419
POLYVINYL-CHLORIDE ROOFING - VERSICO

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Adhered roof system with polyvinyl-chloride (PVC) roofing membrane.
- B. Deck sheathing.
- C. Insulation.

1.02 REFERENCE STANDARDS

- A. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- B. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- C. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board; 2014.
- D. ASTM D4434/D4434M - Standard Specification for Poly(Vinyl Chloride) Sheet Roofing; 2012.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials; 2016.
- F. ASTM E1980 - Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces; 2011.
- G. FM (AG) - FM Approval Guide; current edition.
- H. FM DS 1-28 - Wind Design; 2007.
- I. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components; 2016, with Editorial Revision (2022).
- J. UL 790 - Standard for Standard Test Methods for Fire Tests of Roof Coverings; Current Edition, Including All Revisions.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene one week before starting work of this section.
 - 1. Review preparation and installation procedures, in addition to coordination and scheduling required with related work.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide manufacturer's written information listed below.
 - 1. Product data indicating membrane materials, flashing materials, insulation, vapor retarder, surfacing, and fasteners.
- C. Shop Drawings: Indicate joint or termination detail conditions, conditions of interface with other materials, setting plan for tapered insulation, mechanical fastener layout, and paver layout.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Field Reports: Indicate procedures followed, ambient temperatures, humidity, wind velocity during application, and supplementary instructions provided.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.
- H. Warranty Documentation.
 - 1. Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

2. Submit installer's certification that installation complies with required warranty conditions for waterproofing membrane.

1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with at least twenty years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least ten years documented experience.
 1. Approved by membrane manufacturer.
 2. Extend manufacturer's labor and materials warranty.
 3. Extend manufacturer's "No Dollar Limit" warranty.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original containers, dry, undamaged, with seals and labels intact.
- B. Store products in weather protected environment, clear of ground and moisture.
- C. Protect foam insulation from direct exposure to sunlight.
- D. Provide Safety Data Sheets (SDS) at project site during transportation, storage, and installation of materials.

1.07 FIELD CONDITIONS

- A. Do not apply roofing membrane during unsuitable weather, and refer to manufacturer's written installation instructions.
- B. Do not apply roofing membrane when ambient temperature is below 40 degrees F or above 100 degrees F.
- C. Do not apply roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring.
- D. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed that same day.
- E. Proceed with work so new roofing materials are not subject to construction traffic as work progresses.
- F. Do not allow grease, oils, fats, or other contaminants to come into direct contact with roofing membrane.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Material Warranty: Provide membrane manufacturer's warranty agreeing to replace material that shows manufacturing defects within 30 after installation.
- C. System Warranty: Provide manufacturer's system warranty agreeing to repair or replace roofing membrane that leaks or is damaged due to wind or other natural causes.
 1. System Warranty Term: 30 years.
 2. For repair and replacement include costs of both material and labor in warranty.

PART 2 PRODUCTS

2.01 MANUFACTURER

- A. Basis of design: Versico Roofing Systems: www.versico.com/#sle.

2.02 ROOFING APPLICATIONS

- A. Polyvinyl-Chloride (PVC) Membrane Roofing: Single-ply membrane.
 1. Adhered, over insulation.

2.03 PERFORMANCE / DESIGN CRITERIA

- A. Solar Reflectance Index (SRI): Minimum of 64 based on three-year aged value; if three-year aged data is not available, minimum of 82 initial value, calculated in accordance with ASTM E1980.
 - 1. Field applied coating may not be used to achieve specified SRI.
- B. Roof Covering External Fire Resistance Classification: Class A when tested in accordance to UL 790.
- C. Wind Uplift:
 - 1. Designed to withstand wind uplift forces calculated in accordance with ASCE 7.
 - 2. Design Wind Speed: As indicated on drawings.
- D. Insulation Thermal Resistance (R-Value): Provide thermal resistance performance as indicated on drawings..

2.04 ROOFING MEMBRANE MATERIALS

- A. Single Source Responsibility: Provide and install products from single source.
- B. Vapor Barrier/Base Sheet: Self-adhering, rubberized asphalt membrane laminated to spun-bonded polyester fabric; 40 mils (0.040 inch) thick, minimum.
 - 1. Products:
 - a. Versico Roofing Systems; VapAir Seal 725TR Air/Vapor Barrier: www.versico.com/#sle.
- C. Membrane: Polyvinyl-Chloride (PVC); ASTM D4434/D4434M, internally reinforced.
 - 1. Thickness: 80 mils, 0.080 inch, minimum.
 - 2. Sheet Width: Factory fabricated into largest sheets possible.
 - 3. Color: White.
 - 4. Products:
 - a. Versico Roofing Systems; VersiFlex KEE HP PVC: www.versico.com/#sle.
- D. Seaming Materials: As recommended by membrane manufacturer.
- E. Flexible Flashing Material: Same material as roofing membrane.
- F. Base Flashing: Provide waterproof, fully adhered base flashing system at penetrations, plane transitions, and terminations.

2.05 DECK SHEATHING

- A. Deck Sheathing and/or Cover Board: Glass mat faced gypsum panels, ASTM C1177/C1177M, fire resistant type.
 - 1. Thickness: 5/8 inch, minimum.
 - 2. Products:
 - a. GP DensDeck Prime Roof Board, distributed by Versico: www.versico.com/#sle.

2.06 INSULATION

- A. Polyisocyanurate (ISO) Board Insulation: Complying with ASTM C1289, Type II, Class 2 - Faced with coated glass fiber mat facers on both major surfaces of core foam.
 - 1. Board Thickness: 2 inch, nominal.
 - 2. Grade and Compressive Strength: Grade 2, with 20 psi, minimum.
 - 3. Provide tapered insulation as required by drawings.
 - 4. Products:
 - a. Versico Roofing Systems; SecurShield Polyiso: www.versico.com/#sle.

2.07 ACCESSORIES

- A. Prefabricated Flashing Accessories:
 - 1. Corners and Seams:
 - a. Curb Wrap Corners: PVC or KEE HP, 60 mil, 0.060 inch thick; used for flashing wraps at curb corners.

- 1) Color: White.
 - 2) Curb Size: As indicated on drawings.
 - 3) Products:
 - (a) Versico Roofing Systems; VersiFlex PVC Curb Wrap Corners:
www.versico.com/#sle.
 - b. Cover Strip, Reinforced: 80 mil, 0.080 inch thick, PVC flashing with polyester reinforcing fabric, 8 inch wide, used for stripping in rows of fasteners and plates and covering butt joints on PVC membranes.
 - 1) Color: White.
 - 2) Products:
 - (a) Versico Roofing Systems; VersiFlex PVC Reinforced Coverstrip:
www.versico.com/#sle.
2. Penetrations: Same material as membrane, with manufacturer's standard cut-outs, rigid inserts, clamping rings, and flanges.
 - a. Pipe Seals: Prefabricated PVC flashing for pipes 1 inch to 6 inch in diameter.
 - 1) Products:
 - (a) Versico Roofing Systems; VersiFlex PVC Split Pipe Seals:
www.versico.com/#sle.
 - b. Molded Pipe Seals: Injection-molded PVC flashing for pipes 3/4 inch to 8 inch in diameter.
 - 1) Color: White.
 - 2) Products:
 - (a) Versico Roofing Systems; VersiFlex PVC Molded Pipe Seals:
www.versico.com/#sle.
 - c. Square Tubing Wraps: Fabricated PVC flashing for penetrations, 3 inch square, with 11 inch overall height.
 - 1) Products:
 - (a) Versico Roofing Systems; VersiFlex PVC Square Tubing Wraps:
www.versico.com/#sle.
 - d. Sealant Pockets: Interlocking, two-piece, injection molded flexible pocket with rigid 6 inch high vertical flange and pre-formed deck flange, used to waterproof pipe clusters or other oddly shaped penetrations.
 - 1) Pocket Adjustment: Adjustable from 7-1/2 inch to 11-1/2 inch long.
 - 2) Products:
 - (a) Versico Roofing Systems; VersiFlex PVC Molded Sealant Pockets:
www.versico.com/#sle.
- B. Insulation Adhesive: Two component polyurethane, expanding foam.
- C. Insulation Joint Tape: Glass fiber reinforced type as recommended by insulation manufacturer, and compatible with roofing materials; 6 inch wide; self adhering.
- D. Fasteners: Appropriate for application indicated as recommended and approved by membrane manufacturer.
 1. Length as required for thickness of membrane and insulation material and penetration of deck substrate; with metal washers.
 2. Seam Fastening Plate: Use 2 inch diameter metal plate for insulation attachment on mechanically fastened systems, or membrane securement at angle changes on adhered systems with manufacturer's acceptable fasteners.
 3. Insulation Fastening Plate: Use 3 inch nominal diameter metal plate with manufacturer's acceptable fasteners to attach insulation.
- E. Walkway Rolls: Heat weldable PVC membrane, 36 inch wide by 60 feet long, and 90 mils, 0.090 inch thick, gray colored; used to protect PVC membrane in areas exposed to foot traffic.
 1. Products:

- a. Versico Roofing Systems; PVC Walkway Rolls: www.versico.com/#sle.
- F. Membrane Adhesive: As recommended by membrane manufacturer.
 - 1. Bonding Adhesive: Low-VOC, water-based, wet lay-in, one-sided dispersion adhesive and light tan colored.
 - a. Products:
 - 1) Versico Roofing Systems; VersiFlex PVC HydroBond Water-Based Adhesive: www.versico.com/#sle.
- G. Surface Conditioner for Adhesives: Compatible with membrane and adhesives.
- H. Strip Reglet Devices: Consisting of galvanized steel, with maximum possible length for each location and attachment flanges.
- I. Sealants: As recommended by membrane manufacturer.
- J. Membrane Cleaner: Manufacturer's recommended products for applications indicated.
- K. Primer: Manufacturer's recommended products for applications indicated.
- L. Roof Edgings and Terminations: Manufacturer's standard roof edge and termination accessories.
 - 1. Aluminum Cover: 0.050 inch thick, with finish as selected by Architect.
 - 2. Color: As selected by Architect.
 - 3. Termination Bar: Decorative metal cover over formed aluminum termination bar, 1-3/4 inch wide, with slotted fastening holes.
 - a. Products:
 - 1) Versico Roofing Systems; VersiTrim Term Bar Fascia: www.versico.com/#sle.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that surfaces and site conditions are ready to receive work.
- B. Verify deck is supported and secure.
- C. Verify deck is clean and smooth, flat, free of depressions, waves, or projections, properly sloped and suitable for installation of roof system.
- D. Verify deck surfaces are dry and free of snow or ice.
- E. Verify that roof openings, curbs, and penetrations through roof are solidly set, and cant strips, nailing strips, and reglets are in place.

3.02 SURFACE PREPARATION

- A. Clean substrate thoroughly prior to roof application.
- B. Do not begin this work until other work that requires foot or equipment traffic on roof has been completed.
- C. Apply manufacturer's recommended vapor retarder or temporary roofing before roof installation.

3.03 METAL DECK PREPARATION

- A. Acoustic Metal Decking: Install preformed sound-absorbing glass-fiber insulation strips within acoustic deck flutes; see Section 053100 for additional information.

3.04 INSTALLATION - GENERAL

- A. Install roofing system in accordance with manufacturer's instructions, as well as NRCA (RM) and NRCA (WM) applicable requirements.
- B. Application of roofing membrane during unsuitable weather is not permitted.
- C. Application of roofing membrane when ambient temperature is outside temperature range recommended by manufacturer is not permitted.

- D. Application of roofing membrane to damp or frozen deck surface or when precipitation is expected or occurring is not permitted.
- E. Exposing materials vulnerable to water or sun damage in quantities greater than can be weatherproofed the same day is not permitted.
- F. Coordinate this work with installation of associated counterflashings being installed as specified in other sections as this work proceeds.

3.05 INSULATION APPLICATION

- A. Attachment of Insulation:
 - 1. Mechanically fasten insulation to deck in accordance with roofing manufacturer's instructions and FM (AG), FM DS 1-28, and FM DS 1-29 applicable requirements.
- B. Installing wet, damaged, or warped insulation boards is not permitted.
- C. Apply subsequent layers of insulation with joints staggered minimum 6 inch from joints of preceding layer.
- D. Apply tapered insulation to required slope pattern in accordance with manufacturer's instructions.
- E. On metal deck, place boards parallel to flutes with insulation board edges bearing on deck flutes.
- F. Apply boards with edges in moderate contact without forcing, and with gap between boards no greater than 1/4 inch wide; cut insulation to fit neatly to perimeter blocking and around penetrations through roof.
- G. Tape joints of insulation in accordance with roofing and insulation manufacturer's instructions.
- H. Only apply quantity of insulation than can be completely waterproofed in same day.

3.06 MEMBRANE APPLICATION

- A. Roll out membrane, free from wrinkles or tears; place sheet membrane into place without stretching.
- B. Shingle joints on sloped substrates in direction of drainage.
- C. Adhesive Adhered Membrane Application: Apply adhesive at manufacturer's recommended rate, and fully embed membrane in adhesive except in areas directly over or within 3 inch of expansion joints; fully adhere one roll before proceeding to adjacent rolls.
- D. Seam Welding:
 - 1. Overlap edges and ends at least 2 inch, and seal seams by heat welding.
 - 2. Cover seams with joint covers as recommended by membrane manufacturer.
 - 3. Probe each seam once welds have thoroughly cooled, approximately 30 minutes.
 - 4. Repair any deficient seams within same work day.
 - 5. Seal cut edges of reinforced membrane after seam probe has been completed.
 - a. Seal with cut edge type sealant as recommended by membrane manufacturer.
- E. At membrane intersections with vertical surfaces, provide the following:
 - 1. Extend membrane over and up cant strips at least 4 inch onto vertical surfaces.
 - 2. Fully adhere flexible flashing over membrane and up to nailing strips.
 - 3. Insert flashing into reglets and secure.
- F. Install prefabricated joint components in accordance with manufacturer's instructions.
- G. Coordinate installation of roof related flashings, sumps, and drains; locate field splices away from low areas and roof drains, and shingle lap upslope sheets over downslope sheets.
- H. Install walkway pads at areas of concentrated traffic and as indicated on drawings; space pad joints to permit drainage.

- I. Daily Seal: Provide daily seal in accordance with manufacturer's installation instructions at end of each work day to prevent infiltration of water at incomplete flashings, terminations, and other unfinished membrane edges.

3.07 FIELD QUALITY CONTROL

- A. Attendance is required on-site of roofing material manufacturer's daily during installation of this work.

3.08 CLEANING

- A. Remove wrappings, empty containers, paper, and other debris from roof daily, and dispose of debris in compliance with local, State, and Federal regulations.
- B. Remove bituminous markings from finished surfaces.
- C. In areas where finished surfaces are soiled by work of this section, consult manufacturer of surfaces for cleaning advice and comply with their documented instructions.
- D. Repair or replace defaced or damaged finishes caused by work of this section.

3.09 PROTECTION

- A. Protect installed roofing and flashings from construction operations.
- B. Where traffic must continue over finished roof membrane, protect surfaces using durable materials.

END OF SECTION 075419

This page intentionally left blank

SECTION 075563
VEGETATED PROTECTED MEMBRANE ROOFING

<<<<<<<< UPDATE NOTES

PART 2 PRODUCTS

END OF SECTION 075563

This page intentionally left blank

**SECTION 077100
ROOF SPECIALTIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Manufactured roof specialties, including pipe penetrations.

1.02 REFERENCE STANDARDS

- A. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- B. NRCA (RM) - The NRCA Roofing Manual; 2017.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on shape of components, materials and finishes, anchor types and locations.

PART 2 PRODUCTS

2.01 COMPONENTS

- A. Pipe and Penetration Flashing: Base of rounded aluminum, compatible with PVC sheet membrane roof systems, and capable of accomodating pipes sized between 3/8 inch and 12 inch.
 - 1. Caps: Clear anodized.
- B. Roof Penetration Sealing Systems: Premanufactured components and accessories as required to preserve integrity of roofing system and maintain roof warranty; suitable for conduits and roofing system to be installed; designed to accommodate existing penetrations where applicable.
- C. Pipe Penetration Wall Seal: Seal for HVAC piping wall penetrations with wall-mounted rigid plastic outlet cover and elastomeric wall seal gasket.
 - 1. Outlet Cover Color: Gray.
- D. Pipe Penetration Wall Seal and Insulated Piping Protection System: Seal for HVAC piping wall penetrations with wall mounted rigid plastic outlet cover and elastomeric wall seal gasket and having mechanical line insulation with PVC protective cover.
 - 1. Outlet Cover Color: Gray.
 - 2. PVC Insulation Cover Color: Black with full-length velcro fastener.

2.02 ACCESSORIES

- A. Sealant for Joints in Linear Components: As recommended by component manufacturer.
- B. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.

2.03 FINISHES

- A. Clear Anodized Finish: AAMA 611 AA-M12C22A41 Class I clear anodic coating not less than 0.7 mil, 0.0007 inch thick.

2.04 ACCESSORIES

- A. Sealant for Joints in Linear Components: As recommended by component manufacturer.
- B. Adhesive for Anchoring to Roof Membrane: Compatible with roof membrane and approved by roof membrane manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that deck, curbs, roof membrane, base flashing, and other items affecting work of this Section are in place and positioned correctly.

3.02 INSTALLATION

- A. Install components in accordance with manufacturer's instructions and NRCA (RM) applicable requirements.
- B. Seal joints within components when required by component manufacturer.
- C. Anchor components securely.
- D. Coordinate installation of components of this section with installation of roofing membrane and base flashings.
- E. Coordinate installation of sealants and roofing cement with work of this section to ensure water tightness.
- F. Coordinate installation of flashing flanges into reglets.

END OF SECTION 077100

**SECTION 077123
MANUFACTURED GUTTERS AND DOWNSPOUTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Pre-finished aluminum gutters and downspouts.

1.02 REFERENCE STANDARDS

- A. AAMA 2604 - Voluntary Specification, Performance Requirements and Test Procedures for High Performance Organic Coatings on Aluminum Extrusions and Panels; 2013.
- B. SMACNA (ASMM) - Architectural Sheet Metal Manual; 2012.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Comply with SMACNA (ASMM) for sizing components for rainfall intensity determined by a storm occurrence of 1 in 5 years.
- B. Comply with applicable code for size and method of rain water discharge.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on prefabricated components.
- C. Shop Drawings: Indicate locations, configurations, jointing methods, fastening methods, locations, and installation details.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Stack material to prevent twisting, bending, or abrasion, and to provide ventilation. Slope to drain.
- B. Prevent contact with materials that could cause discoloration, staining, or damage.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Pre-Finished Aluminum Sheet: ASTM B209 (ASTM B209M); 0.050 inch thick.
 - 1. Finish: Plain, shop pre-coated with modified silicone coating.
 - 2. Color: As indicated.

2.02 COMPONENTS

- A. Gutters: SMACNA rectangular style profile.
- B. Downspouts: SMACNA Rectangular profile.
- C. Anchors and Supports: Profiled to suit gutters and downspouts.
 - 1. Anchoring Devices: In accordance with CDA requirements.
 - 2. Gutter Supports: Brackets.
 - 3. Downspout Supports: Brackets.
- D. Fasteners: Stainless steel , with soft neoprene washers.

2.03 ACCESSORIES

- A. Splash Pads: Precast concrete type, profiles size(s) as indicated; minimum 3,000 psi compressive strength at 28 days, with minimum 5 percent air entrainment.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.

3.02 INSTALLATION

- A. Install gutters, downspouts, and accessories in accordance with manufacturer's instructions.
- B. Slope gutters min. 1/4" per 10' (or as required by code).
- C. Connect downspouts to storm sewer system. Grout connection watertight.

END OF SECTION 077123

**SECTION 077200
ROOF ACCESSORIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Roof curbs.
- B. Equipment rails.
- C. Roof penetrations mounting curbs.
- D. Non-penetrating pedestals.

1.02 REFERENCE STANDARDS

- A. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products; 2015.
- B. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 2016a.
- C. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process; 2021a.
- D. MSS SP-58 - Pipe Hangers and Supports - Materials, Design, Manufacture, Selection, Application, and Installation; 2009.
- E. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used.
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Maintenance requirements.
- C. Shop Drawings: Submit detailed layout developed for this project and provide dimensioned location and number for each type of roof accessory.
 - 1. Submit shop drawings sealed and signed by a Professional Engineer experienced in design of this type of work and licensed in Florida.
- D. Warranty Documentation:
 - 1. Submit manufacturer warranty.
 - 2. Ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store products under cover and elevated above grade.

1.05 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.

PART 2 PRODUCTS

2.01 ROOF CURBS

- A. Manufactured Curbs:
 - 1. AES Industries Inc; _____: www.aescurb.com/#sle.
 - 2. The Pate Company; _____: www.patecurbs.com/#sle.
 - 3. Substitutions: See Section 016000 - Product Requirements.

- B. Roof Curbs Mounting Assemblies: Factory fabricated hollow sheet metal construction, internally reinforced, and capable of supporting superimposed live and dead loads and designated equipment load with fully mitered and sealed corner joints welded or mechanically fastened, and integral counterflashing with top and edges formed to shed water.
 - 1. Roof Curb Mounting Substrate: Curb substrate consists of flat roof deck sheathing with insulation.
 - 2. Sheet Metal Material:
 - a. Aluminum: 0.080 inch minimum thickness, with 3003 alloy, and H14 temper.
 - 1) Finish: Clear anodized.
 - 3. Roofing Cants: Provide integral sheet metal roofing cants dimensioned to begin slope at top of roofing system at 1:1 slope; minimum cant height 4 inches.
 - 4. Provide layouts and configurations indicated on drawings.
- C. Curbs Adjacent to Roof Openings: Provide curb on each side of opening, with top of curb horizontal for equipment mounting.
 - 1. Provide preservative treated wood nailers along top of curb.
 - 2. Insulate inside curbs with 1-1/2 inch thick fiberglass insulation.
 - 3. Height Above Finished Roof Surface: 8 inches, minimum.
- D. Equipment Rail Curbs: Straight curbs on each side of equipment, with top of curbs horizontal and level with each other for equipment mounting.
 - 1. Height Above Finished Roof Surface: 8 inches, minimum.
 - 2. Products:
- E. Pipe, Duct, or Conduit Mounting Curbs: Vertical posts, minimum 8 inches square unless otherwise indicated.
 - 1. Provide sliding channel welded along top edge with adjustable height steel bracket, fabricated to fit item supported.
 - 2. Height Above Finished Roof Surface: 8 inches, minimum.

2.02 NON-PENETRATING ROOFTOP SUPPORTS/ASSEMBLIES

- A. Non-Penetrating Rooftop Support/Assemblies: Manufacturer-engineered and factory-fabricated, with pedestal bases that rest on top of roofing membrane, and not requiring any attachment to roof structure and not penetrating roofing assembly.
 - 1. Design Loadings and Configurations: As required by applicable codes.
 - 2. Height: Provide minimum clearance of 6 inches under supported items to top of roofing.
 - 3. Support Spacing and Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - 4. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.
 - 5. Hardware, Bolts, Nuts, and Washers: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A153/A153M.
- B. Pipe Supports: Provide attachment fixtures complying with MSS SP-58 and as indicated.
 - 1. Attachment/Support Fixtures: As recommended by manufacturer, same type as indicated for equivalent indoor hangers and supports; corrosion resistant material.
- C. Duct Supports: Provide extruded aluminum supports and sized in accordance with diameter of supported ducts, and with base that is non-penetrating of roofing membrane.
- D. Conduit and Cable Tray Supports:
- E. Non-Penetrating Pedestals: Steel pedestals with square, round, or rectangular bases.
 - 1. Bases: High density polypropylene.
 - 2. Base Sizes: As required to distribute load sufficiently to prevent indentation of roofing assembly.
 - 3. Steel Components: Stainless steel, or carbon steel hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using methods recommended by manufacturer for achieving acceptable results for applicable substrate under project conditions.

3.03 INSTALLATION

- A. Install in accordance with manufacturer's instructions, in manner that maintains roofing system weather-tight integrity.

3.04 CLEANING

- A. Clean installed work to like-new condition.

3.05 PROTECTION

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

END OF SECTION 077200

This page intentionally left blank

**SECTION 078400
FIRESTOPPING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Firestopping of joints and penetrations in fire resistance rated and smoke resistant assemblies, whether indicated on drawings or not, and other openings indicated.

1.02 RELATED REQUIREMENTS

- A. Section 070553 - Fire and Smoke Assembly Identification.
- B. Section 078100 - Applied Fire Protection.

1.03 REFERENCE STANDARDS

- A. ASTM E119 - Standard Test Methods for Fire Tests of Building Construction and Materials; 2015.
- B. ASTM E814 - Standard Test Method for Fire Tests of Through-Penetration Fire Stops; 2013a.
- C. ASTM E2174 - Standard Practice for On-Site Inspection of Installed Firestops; 2014.
- D. ASTM E2393 - Standard Practice for On-Site Inspection of Installed Fire Resistive Joint Systems and Perimeter Fire Barriers; 2010a.
- E. ASTM E2837 - Standard Test Method for Determining the Fire Resistance of Continuity Head-of-Wall Joint Systems Installed Between Rated Wall Assemblies and Nonrated Horizontal Assemblies; 2013.
- F. ASTM G21 - Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi; 2015.
- G. ITS (DIR) - Directory of Listed Products; current edition.
- H. FM 4991 - Approval Standard for Firestop Contractors; 2013.
- I. FM (AG) - FM Approval Guide; current edition.
- J. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.
- K. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- L. UL (FRD) - Fire Resistance Directory; current edition.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance ratings, and limitations.
- C. Sustainable Design Submittal: Submit VOC content documentation for nonpreformed materials.
- D. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system or fire-resistive joint system, submit illustration, with modifications marked, approved by system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.
- E. Manufacturer's Installation Instructions: Indicate preparation and installation instructions.
- F. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- G. Installer's qualification statement.

1.05 QUALITY ASSURANCE

- A. Fire Testing: Provide firestopping assemblies of designs that provide the scheduled fire ratings when tested in accordance with methods indicated.
 - 1. Listing in UL (FRD), FM (AG), or ITS (DIR) will be considered as constituting an acceptable test report.

- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- C. All through-penetration firestops shall be provided by one manufacturer.
- D. Installer Qualifications: Company specializing in performing the work of this section and:
 - 1. Trained by manufacturer.
 - 2. Approved by Factory Mutual Research Corporation under FM 4991, or meeting any two of the following requirements:
 - 3. Verification of minimum three years documented experience installing work of this type.
 - 4. Verification of at least five satisfactorily completed projects of comparable size and type.
 - 5. Licensed by local authorities having jurisdiction (AHJ).
- E. All fire-resistive joints and perimeter fire barriers shall be provided by one manufacturer.

1.06 MOCK-UP

- A. Install one firestopping assembly representative of each fire rating design required on project.
 - 1. Where one design may be used for different penetrating items or in different wall constructions, install one assembly for each different combination.
- B. If accepted, mock-up will represent minimum standard for this work.

1.07 FIELD CONDITIONS

- A. Comply with firestopping manufacturer's recommendations for temperature and conditions during and after installation; maintain minimum temperature before, during, and for three days after installation of materials.
- B. Provide ventilation in areas where solvent-cured materials are being installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Firestopping Manufacturers:
 - 1. 3M Fire Protection Products; _____: www.3m.com/firestop/#sle.
 - 2. Hilti, Inc; _____: www.us.hilti.com/#sle.
 - 3. Specified Technologies Inc; _____: www.stifirestop.com/#sle.
 - 4. RectorSeal.
 - 5. Substitutions: See Section 016000 - Product Requirements.

2.02 MATERIALS

- A. Volatile Organic Compound (VOC) Content: Provide products having VOC content lower than that required by SCAQMD 1168.
- B. Mold and Mildew Resistance: Provide firestopping materials with mold and mildew resistance rating of zero(0) in accordance with ASTM G21.
- C. Primers, Sleeves, Forms, Insulation, Packing, Stuffing, and Accessories: Provide type of materials as required for tested firestopping assembly.
- D. Fire Ratings: Refer to drawings for required systems and ratings.

2.03 FIRESTOPPING ASSEMBLY REQUIREMENTS

- A. Head-of-Wall (HW) Joint System Firestopping at Joints Between Fire-Rated Wall Assemblies and Non-Rated Horizontal Assemblies: Use system that has been tested according to ASTM E2837 to have fire resistance F Rating equal to required fire rating of wall assembly.
- B. Through Penetration Firestopping: Use system that has been tested according to ASTM E814 to have fire resistance F Rating equal to required fire rating of penetrated assembly.
 - 1. Temperature Rise: Provide systems that have been tested to show T Rating as indicated.
 - 2. Air Leakage: Provide systems that have been tested to show L Rating as indicated.
 - 3. Listing by FM (AG), ITS (DIR), UL (DIR), or UL (FRD) in their certification directories will be considered evidence of successful testing.

2.04 FIRESTOPPING PENETRATIONS THROUGH CONCRETE AND CONCRETE MASONRY CONSTRUCTION

- A. Blank Openings:
 - 1. In Floors or Walls:
 - a. 2 Hour Construction: UL System C-AJ-0090; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System C-AJ-0015; Specified Technologies Inc. SSM mortar.
- B. Penetrations Through Floors or Walls By:
 - 1. Multiple Penetrations in Large Openings:
 - a. 2 Hour Construction: UL System C-AJ-8055; Specified Technologies Inc. SSP Firestop Putty.
 - b. 2 Hour Construction: UL System C-AJ-8114; Specified Technologies Inc. SSM mortar.
 - 2. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System C-AJ-1226; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - 3. Uninsulated Non-Metallic Pipe, Conduit, and Tubing:
 - a. 2 Hour Construction: UL System C-AJ-2167; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - b. 2 Hour Construction: UL System C-AJ-2109; Hilti CP 643N/644 Firestop Collar.
 - 4. Electrical Cables Not In Conduit:
 - a. 2 Hour Construction: UL System W-J-3046; Specified Technologies Inc. SSP Firestop Putty.
 - 5. Cable Trays with Electrical Cables:
 - a. 2 Hour Construction: UL System C-AJ-4094; Hilti CFS-BL Firestop Block.
 - 6. Insulated Pipes:
 - a. 2 Hour Construction: UL System C-AJ-5091; Hilti FS-ONE IMAX intumescent Firestop Sealant.
 - 7. HVAC Ducts, Uninsulated:
 - a. 2 Hour Construction: UL System C-AJ-7111; Hilti FS-ONE MAX Intumescent Firestop Sealant.
- C. Penetrations Through Walls By:
 - 1. Uninsulated Metallic Pipe, Conduit, and Tubing:
 - a. 1 Hour Construction: UL System W-J-1067; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - 2. Insulated Pipes:
 - a. 1 Hour Construction: UL System C-AJ-5090; Hilti FS-ONE MAX Intumescent Firestop Sealant.
 - 3. HVAC Ducts, Uninsulated:
 - a. 2 Hour Construction: UL System W-J-7092; Specified Technologies Inc. FyreFlange HVAC Firestop Angle.
 - b. 2 Hour Construction: UL System W-J-7109; Hilti FS-ONE MAX Intumescent Firestop Sealant or CP 606 Flexible Firestop Sealant.
 - 4. HVAC Ducts, Insulated:
 - a. 2 Hour Construction: UL System W-J-7112; Hilti FS-ONE MAX Intumescent Firestop Sealant.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify openings are ready to receive the work of this section.

- B. Inspections of through-penetration firestop systems shall be conducted in accordance with the Post-Installation Method outlined in ASTM E 2174. A minimum of 2%, but not less than one, of each type of firestop system shall be inspected per floor or for each area of a floor when a floor is larger than 10,000 square feet.
- C. Inspections of fire-resistive joints and perimeter fire barrier systems shall be conducted in accordance with the Post-Installation Method outlined in ASTM E 2393. A minimum of one sample per 500 lineal feet, but not less than one, of each type of fire-resistive joint shall be inspected.
- D. Destructive testing shall be done in accordance with the International Firestop Counsel's (IFC) IFC Recommended Guidelines for Performing Destructive testing for Installed Penetration Firestop Systems, Fire-Resistive Joint Systems, or Perimeter Fire Barrier Systems dated April 10, 2012.

3.02 PREPARATION

- A. Clean substrate surfaces of dirt, dust, grease, oil, loose material, or other materials that could adversely affect bond of firestopping material.
- B. Remove incompatible materials that could adversely affect bond.
- C. Install backing materials to prevent liquid material from leakage.

3.03 INSTALLATION

- A. Install materials in manner described in fire test report and in accordance with manufacturer's instructions, completely closing openings.
- B. Do not cover installed firestopping until inspected by Owner's Independent Testing Agency.
- C. Install labeling required by code.

3.04 FIELD QUALITY CONTROL

- A. Independent Testing Agency: Inspection agency employed and paid by Owner, will examine penetration firestopping in accordance with ASTM E2174 and ASTM E2393.
- B. Repair or replace penetration firestopping and joints at locations where inspection results indicate firestopping or joints do not meet specified requirements.
- C. Where deficiencies are found or firestops are damaged or removed because of testing, repair, or replacing firestopping to comply with requirements:
 - 1. Any type of firestop or fire-resistive joint system does not comply with the inspection documents will require repair or replacement and re-inspection of that firestop/joint system plus one full additional inspection of the percentage specified for that system type. If non-compliance occurs on 10% or more of the quantities of firestop products, systems, or joints, then inspection of those particular types will cease. The installer shall inspect their own work and shall repair or replace those system types with the area prior to recommencement of inspections by the inspector.
 - 2. The cost for repair, replacement of tested locations, re-inspection (if required), and retesting (if required), shall be paid for by the contractor and/or sub-contractor. The Owner shall not be responsible for additional costs.
 - 3. The time and expenses for the Special Inspector for Firestop Systems to re-inspect or direct any retests shall be a charge to the Construction Manager based on actual time and expenses, with a minimum charge of \$1,000 per day. The costs associated with re-inspection and/or re-testing shall be paid by the Construction Manager to the Special Inspector. The Construction Manager shall be responsible for any cost recovery for re-inspection and retesting costs from the associated sub-contractor.

3.05 CLEANING

- A. Clean adjacent surfaces of firestopping materials.

3.06 PROTECTION

- A. Protect adjacent surfaces from damage by material installation.

END OF SECTION 078400

**SECTION 079200
JOINT SEALANTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Nonsag gunnable joint sealants.
- B. Joint backings and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM C794 - Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants; 2015.
- B. ASTM C834 - Standard Specification for Latex Sealants; 2014.
- C. ASTM C919 - Standard Practice for Use of Sealants in Acoustical Applications; 2012.
- D. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- E. ASTM C1087 - Standard Test Method for Determining Compatibility of Liquid-Applied Sealants with Accessories Used in Structural Glazing Systems; 2000 (Reapproved 2011).
- F. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- G. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants; 2008 (Reapproved 2012).
- H. ASTM C1521 - Standard Practice for Evaluating Adhesion of Installed Weatherproofing Sealant Joints; 2013.
- I. SCAQMD 1168 - South Coast Air Quality Management District Rule No.1168; current edition.

1.03 SUBMITTALS

- A. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
 - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
 - 2. List of backing materials approved for use with the specific product.
 - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
 - 4. Substrates the product should not be used on.
- B. Product Data for Accessory Products: Submit manufacturer's technical data sheet for each product to be used, including physical characteristics, installation instructions, and recommended tools.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.
- D. Sustainable Design Documentation: For sealants and primers, submit VOC content and emissions documentation; see Section 016116.
- E. Preconstruction Laboratory Test Reports: Submit at least four weeks prior to start of installation.
- F. Field Quality Control Plan: Submit at least two weeks prior to start of installation.
- G. Field Quality Control Log: Submit filled out log for each length or instance of sealant installed, within 10 days after completion of inspections/tests; include bagged test samples and photographic records, if any.

1.04 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document covering installation requirements on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

- C. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.
- D. Testing Agency Qualifications: Independent firm specializing in performing testing and inspections of the type specified in this section.
- E. Preconstruction Laboratory Testing: Arrange for sealant manufacturer(s) to test each combination of sealant, substrate, backing, and accessories.
 - 1. Adhesion Testing: In accordance with ASTM C794.
 - 2. Compatibility Testing: In accordance with ASTM C1087.
 - 3. Allow sufficient time for testing to avoid delaying the work.
 - 4. Deliver to manufacturer sufficient samples for testing.
 - 5. Report manufacturer's recommended corrective measures, if any, including primers or techniques not indicated in product data submittals.
 - 6. Testing is not required if sealant manufacturer provides data showing previous testing, not older than 24 months, that shows satisfactory adhesion, lack of staining, and compatibility.
- F. Field Quality Control Plan:
 - 1. Inspection and testing to be performed by the manufacturer's representative.
 - 2. Visual inspection of entire length of sealant joints.
 - 3. Non-destructive field adhesion testing of sealant joints.
 - a. For each different sealant and substrate combination, allow for one test every 12 inches in the first 10 linear feet of joint and one test every 24 inches thereafter.
 - b. If any failures occur in the first 10 linear feet, continue testing at 12 inches intervals at no extra cost to Owner.
 - 4. Field Quality Control Log Form: Show same data fields as on Preinstallation Field Adhesion Test Log, with known information filled out and lines for multiple tests per sealant/substrate combinations; include visual inspection and specified field testing; allow for possibility that more tests than minimum specified may be necessary.
- G. Field Adhesion Test Procedures:
 - 1. Allow sealants to fully cure as recommended by manufacturer before testing.
 - 2. Have a copy of the test method document available during tests.
 - 3. Record the type of failure that occurred, other information required by test method, and the information required on the Field Quality Control Log.
 - 4. If any combination of sealant type and substrate does not show evidence of minimum adhesion or shows cohesion failure before minimum adhesion, report results to Architect.
- H. Non-Destructive Field Adhesion Test: Test for adhesion in accordance with ASTM C1521, using Nondestructive Spot Method.
 - 1. Record results on Field Quality Control Log.
 - 2. Repair failed portions of joints.
- I. Field Adhesion Tests of Joints: Test for adhesion using most appropriate method in accordance with ASTM C1521, or other applicable method as recommended by manufacturer.

1.05 WARRANTY

- A. Correct defective work within a five year period after Date of Substantial Completion.
- B. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

PART 2 PRODUCTS

2.01 JOINT SEALANT APPLICATIONS

- A. Scope:
 - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.

- a. Wall expansion and control joints.
 - b. Joints between door, window, and other frames and adjacent construction.
 - c. Joints between different exposed materials.
 - d. Openings below ledge angles in masonry.
 - e. Other joints indicated below.
2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
 - a. Joints between door, window, and other frames and adjacent construction.
 - b. Between plumbing fixtures and wall.
 - c. Between casework and wall.
 - d. In sound-rated wall and ceiling assemblies, gaps at electrical outlets, wiring devices, piping, and other openings; between wall/ceiling and other construction; and other flanking sound paths.
 - 1) Exception: Through-penetrations in sound-rated assemblies that are also fire-rated assemblies.
 - e. Other joints indicated below.
3. Do not seal the following types of joints.
 - a. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
 - b. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
 - c. Joints where installation of sealant is specified in another section.
 - d. Joints between suspended panel ceilings/grid and walls.
- B. Exterior Joints: Use nonsag non-staining silicone sealant, unless otherwise indicated.
- C. Interior Joints: Use nonsag acrylic latex sealant, unless otherwise indicated.
 1. Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
 2. Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
 3. In Sound-Rated Assemblies: Acrylic emulsion latex sealant.
- D. Interior Wet Areas: Bathrooms, restrooms, kitchens, and food service areas; fixtures in wet areas include plumbing fixtures, food service equipment, countertops, cabinets, and other similar items.
- E. Sound-Rated Assemblies: Walls and ceilings identified as "STC-rated", "sound-rated", or "acoustical".

2.02 JOINT SEALANTS - GENERAL

- A. Sealants and Primers: Provide products having lower volatile organic compound (VOC) content than indicated in SCAQMD 1168.
- B. Colors: As indicated on drawings.

2.03 NONSAG JOINT SEALANTS

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
 1. Movement Capability: +100/-50%, minimum.
 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.
 3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
 4. Color: To be selected by Architect from manufacturer's standard range.
 5. Cure Type: _____.
 6. Service Temperature Range: Minus 20 to 180 degrees F.
- B. Type ____ - Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.

1. Color: White.
- C. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
 1. Color: To be selected by Architect from manufacturer's standard range.
 2. Grade: ASTM C834; Grade Minus 18 Degrees C (0 Degrees F).

2.04 ACCESSORIES

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
 1. Open Cell: 40 to 50 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.
- C. Masking Tape: Self-adhesive, nonabsorbent, non-staining, removable without adhesive residue, and compatible with surfaces adjacent to joints and sealants.
- D. Joint Cleaner: Non-corrosive and non-staining type, type recommended by sealant manufacturer; compatible with joint forming materials.
- E. Primers: Type recommended by sealant manufacturer to suit application; non-staining.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

3.02 PREPARATION

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

3.03 INSTALLATION

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Perform acoustical sealant application work in accordance with ASTM C919.
- D. Install bond breaker backing tape where backer rod cannot be used.
- E. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- F. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- G. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

3.04 FIELD QUALITY CONTROL

- A. Perform field quality control inspection/testing as specified in PART 1 under QUALITY ASSURANCE article.

- B. Non-Destructive Adhesion Testing: If there are any failures in first 100 linear feet, notify Architect immediately.
- C. Remove and replace failed portions of sealants using same materials and procedures as indicated for original installation.

3.05 POST-OCCUPANCY

- A. Post-Occupancy Inspection: Perform visual inspection of entire length of project sealant joints at a time that joints have opened to their greatest width; i.e. at low temperature in thermal cycle. Report failures immediately and repair.

END OF SECTION 079200

This page intentionally left blank

**SECTION 081113
HOLLOW METAL DOORS AND FRAMES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.
- C. Fire-rated hollow metal doors and frames.
- D. Thermally insulated hollow metal doors with frames.
- E. Hollow metal borrowed lites glazing frames.

1.02 RELATED REQUIREMENTS

- A. Section 087101 - HARDWARE.
- B. Section 088000 - Glazing: Glass for doors and borrowed lites.
- C. Section 099113 - Exterior Painting: Field painting.
- D. Section 099123 - Interior Painting: Field painting.

1.03 ABBREVIATIONS AND ACRONYMS

- A. ANSI: American National Standards Institute.
- B. HMMA: Hollow Metal Manufacturers Association.
- C. NAAMM: National Association of Architectural Metal Manufacturers.
- D. NFPA: National Fire Protection Association.
- E. SDI: Steel Door Institute.
- F. UL: Underwriters Laboratories.

1.04 REFERENCE STANDARDS

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design; 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors; 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100); 2014.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames; 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable; 2015.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength; 2014.
- H. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete; 2012.
- I. ASTM C476 - Standard Specification for Grout for Masonry; 2020.
- J. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames; 2014.
- K. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2009.
- L. ITS (DIR) - Directory of Listed Products; current edition.
- M. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames; 2002.

- N. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames; 2011.
- O. NAAMM HMMA 840 - Guide Specifications for Installation and Storage of Hollow Metal Doors and Frames; 2007.
- P. NAAMM HMMA 861 - Guide Specifications for Commercial Hollow Metal Doors and Frames; 2006.
- Q. NFPA 80 - Standard for Fire Doors and Other Opening Protectives; 2019.
- R. NFPA 105 - Standard for Smoke Door Assemblies and Other Opening Protectives; 2016.
- S. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies; 2012.
- T. SDI 117 - Manufacturing Tolerances for Standard Steel Doors and Frames; 2013.
- U. UL (DIR) - Online Certifications Directory; current listings at database.ul.com.
- V. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies; Current Edition, Including All Revisions.
- W. UL 1784 - Standard for Air Leakage Tests of Door Assemblies; Current Edition, Including All Revisions.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.
- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.
- D. Samples: Submit two samples of metal, 2 by 2 inches in size, showing factory finishes, colors, and surface texture.
- E. Manufacturer's Certificate: Certification that products meet or exceed specified requirements.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years documented experience.
 - 1. Provide hollow metal frames from SDI Certified manufacturer.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.
- C. Maintain at project site copies of reference standards relating to installation of products specified.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Hollow Metal Doors and Frames:
 - 1. Ceco Door, an Assa Abloy Group company: www.assaabloydss.com.
 - 2. Republic Doors: www.republicdoor.com.
 - 3. Steelcraft, an Allegion brand: www.allegion.com/us.

2.02 PERFORMANCE REQUIREMENTS

- A. Requirements for Hollow Metal Doors and Frames:

1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
 4. Door Edge Profile: Manufacturers standard for application indicated.
 5. Typical Door Face Sheets: Flush.
 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Flush.
 7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
 8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
 - a. Based on SDI Standards: Provide at least A40/ZF120 (galvanized) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvanized) for corrosive locations.
- B. Hollow Metal Panels: Same construction, performance, and finish as doors.
- C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

2.03 HOLLOW METAL DOORS

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors: Thermally insulated.
1. Grade: ANSI/SDI A250.8 (SDI-100); Level 3 - Extra Heavy-Duty, Physical Performance Level A, Model 2 - Seamless.
 - a. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
 - b. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
 3. Door Thickness: 1-3/4 inches, nominal.
 4. Door Face Sheets: Flush.
 5. Weatherstripping: Refer to Section 087101.
 6. Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- thick, metallic-coated steel channels with channel webs placed even with top and bottom edges. Door top shall be seamless.
- C. Interior Doors, Non-Fire Rated:
1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
 - a. Level 3 - Extra Heavy Duty Commercial.
 - b. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
 3. Door Thickness: 1-3/4 inches, nominal.
 4. Door Face Sheets: Flush.

5. Door Finish: Factory primed and field finished.
- D. Fire-Rated Doors:
 1. Grade: ANSI/SDI A250.8 (SDI-100); Level 3 - Extra Heavy-Duty, Physical Performance Level A, Model 2 - Seamless.
 - a. Physical Performance Level A, 1,000,000 cycles; in accordance with ANSI/SDI A250.4.
 - b. Door Face Metal Thickness: 18 gage, 0.042 inch, minimum.
 - c. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
 2. Fire Rating: As indicated on Door Schedule, tested in accordance with UL 10C and NFPA 252 ("positive pressure fire tests").
 - a. Temperature-Rise Rating (TRR) Across Door Thickness: In accordance with local building code and authorities having jurisdiction.
 - b. Provide units listed and labeled by UL (DIR) or ITS (DIR).
 - c. Attach fire rating label to each fire rated unit.
 - d. Smoke and Draft Control Doors (Indicated with letter "S" on Drawings and/or Door Schedule): Self-closing or automatic closing doors in accordance with NFPA 80 and NFPA 105, with fire-resistance-rated wall construction rated the same or greater than the fire-rated doors, and the following;
 - 1) Maximum Air Leakage: 3.0 cfm/sq ft of door opening at 0.10 inch w.g. pressure, when tested in accordance with UL 1784 at both ambient and elevated temperatures.
 - 2) Gasketing: Provide gasketing or edge sealing as necessary to achieve leakage limit.
 - 3) Label: Include the "S" label on fire-rating label of door.
 3. Door Core Material: Manufacturers standard core material/construction in compliance with requirements.
 4. Door Thickness: 1-3/4 inches, nominal.
 5. Door Face Sheets: Flush.
 6. Door Finish: Factory primed and field finished.

2.04 HOLLOW METAL FRAMES

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Exterior Door Frames: Full profile/continuously welded type with sealed top edge.
 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvanized) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
 2. Frame Metal Thickness: 16 gage, 0.053 inch, minimum.
 3. Frame Finish: Factory primed and field finished.
 4. Weatherstripping: Separate, see Section 087101.
 5. Head: Fully closed top channel at door head.
- D. Interior Door Frames, Non-Fire Rated: Knock-down type.
 1. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.
 2. Frame Finish: Factory primed and field finished.
- E. Door Frames, Fire-Rated: Full profile/continuously welded type.
 1. Fire Rating: Same as door, labeled.
 2. Frame Metal Thickness: 18 gage, 0.042 inch, minimum.
 3. Frame Finish: Factory primed and field finished.
- F. Mullions for Pairs of Doors: Removable type, with profile similar to jambs.
- G. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.

- H. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- I. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
- J. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

2.05 FINISHES

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

2.06 ACCESSORIES

- A. Glazing: as indicated on drawings, factory installed.
- B. Removable Stops: Rolled steel bar, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
- C. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
- D. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
- E. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

3.02 PREPARATION

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Install fire rated units in accordance with NFPA 80.
- C. Coordinate frame anchor placement with wall construction.
- D. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- E. Install door hardware as specified in Section 087100.
- F. Coordinate installation of electrical connections to electrical hardware items.

3.04 TOLERANCES

- A. Clearances Between Door and Frame: Comply with related requirements of specified frame standards or custom guidelines indicated in accordance with SDI 117 or NAAMM HMMA 861.
- B. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

3.05 ADJUSTING

- A. Adjust for smooth and balanced door movement.

END OF SECTION 081113

This page intentionally left blank

**SECTION 083100
ACCESS DOORS AND PANELS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wall access door and frame units.
- B. Ceiling access door and frame units.

1.02 REFERENCE STANDARDS

- A. UL (FRD) - Fire Resistance Directory; current edition.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

PART 2 PRODUCTS

2.01 ACCESS DOORS AND PANELS ASSEMBLIES

- A. Wall-Mounted Units:
 - 1. Location: As indicated on drawings.
 - 2. Material: Steel.
 - 3. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
- B. Wall-Mounted Units in Wet Areas:
 - 1. Location: As indicated on drawings.
 - 2. Material: Steel, hot-dipped zinc, or zinc-aluminum-alloy coated.
 - 3. Wall Mounting Criteria: Provide surface-mounted face frame and door surface flush with frame surface.
- C. Fire-Rated Wall-Mounted Units:
 - 1. Location: As indicated on drawings.
 - 2. Wall Fire-Rating: As indicated on drawings.
 - 3. Material: Steel.
 - 4. Size: As indicated on drawings.
- D. Ceiling-Mounted Units:
 - 1. Location: As indicated on drawings.
 - 2. Material: Steel.
 - 3. Size: As indicated on drawings.
 - 4. Door/Panel: Hinged, standard duty, with tool-operated spring or cam lock and no handle.

2.02 WALL AND CEILING MOUNTED UNITS

- A. Manufacturers:
 - 1. ACUDOR Products Inc: www.acudor.com/#sle.
 - 2. Babcock-Davis; _____: www.babcockdavis.com/#sle.
 - 3. Nystrom, Inc; _____: www.nystrom.com/#sle.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
 - 1. Door Style: Single thickness with rolled or turned in edges.

2. Frames: 16 gage, 0.0598 inch, minimum thickness.
3. Heavy Duty Single Steel Sheet Door Panels: 14 gage, 0.0747 inch, minimum thickness.
4. Units in Fire-Rated Assemblies: Fire rating as required by applicable code for fire-rated assembly that access doors are being installed.
 - a. Provide products listed by UL (FRD) as suitable for purpose indicated.
5. Steel Finish: Primed.
6. Primed and Factory Finish: Polyester powder coat; color as selected by Architect from manufacturer's standard colors.
7. Size: Selected from manufacturer's full range.
8. Hardware:
 - a. Hardware for Fire-Rated Units: As required for listing.
 - b. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
 - c. Latch/Lock: Tamperproof tool-operated cam latch.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that rough openings are correctly sized and located.
- B. Begin installation only after substrates have been properly prepared, and if the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.02 PREPARATION

- A. Prepare surfaces using methods recommended by manufacturer for applicable substrates in accordance with project conditions.

3.03 INSTALLATION

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

END OF SECTION 083100

**SECTION 083326
OVERHEAD COILING GRILLES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Overhead coiling metal grilles and operating hardware; manually operated.

1.02 REFERENCE STANDARDS

- A. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar; 2015.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide, product information , general construction component connections and details, and electrical equipment.
- C. Shop Drawings: Indicate pertinent dimensioning, anchorage methods, hardware locations, and installation details.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum 5 years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least 5 years documented experience.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Overhead Coiling Grilles:
 - 1. Basis of Design: Cornell Iron Works, Inc: Model ESC10..
 - 2. Substitutions: See Section 016000 - Product Requirements.

2.02 GRILLES AND COMPONENTS

- A. Curtain: Stainless steel; horizontal bar curtain, coiling on overhead counterbalanced shaft.
 - 1. Finish: No. 4 - Brushed.
 - 2. Operation: Manual hand chain lift operation (Model ESC10).
 - 3. Mounting : As indicated on drawings.
- B. Guides: Stainless steel angles, of profile to retain grille in place with snap-on trim, mounting brackets of same metal.
- C. Hood Enclosure and Trim: Sheet metal; completely covering operating mechanisms; internally reinforced to maintain rigidity and shape.
 - 1. Material: Stainless steel.
 - 2. Finish: No. 4 - Brushed.
- D. Lock Hardware:
- E. Roller Shaft Counterbalance: Steel pipe and helical steel spring system, capable of producing torque sufficient to ensure smooth operation of curtain from any position and capable of holding position at mid-travel; with adjustable spring tension; requiring 25 lb nominal force to operate.

2.03 MATERIALS

- A. Stainless Steel: ASTM A666 Type 304, with rollable temper.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that adjacent construction is suitable for door installation.
- B. Verify that electrical services have been installed and are accessible.

- C. Verify that door opening is plumb, header is level, and dimensions are correct.
- D. Notify Architect of any unacceptable conditions or varying dimensions.
- E. Commencement of installation indicates acceptance of substrate and door opening conditions.

3.02 INSTALLATION

- A. Install grille unit assembly in accordance with manufacturer's instructions.
- B. Use anchorage devices to securely fasten assembly to wall construction and building framing without distortion or stress.
- C. Securely and rigidly brace components suspended from structure. Secure guides to structural members only.
- D. Fit and align assembly including hardware; level and plumb, to provide smooth operation.
- E. Install enclosure and perimeter trim.

3.03 TOLERANCES

- A. Maintain dimensional tolerances and alignment with adjacent work.
- B. Maximum Variation From Plumb: 1/16 inch.
- C. Maximum Variation From Level: 1/16 inch.
- D. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch per 10 ft straight edge.

3.04 ADJUSTING

- A. Adjust grille, hardware and operating assemblies for smooth and noiseless operation.

3.05 CLEANING

- A. Clean grille and components.
- B. Remove labels and visible markings.

END OF SECTION 083326

**SECTION 084313
ALUMINUM-FRAMED STOREFRONTS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.
- C. Weatherstripping.

1.02 RELATED REQUIREMENTS

- A. Section 087101 - HARDWARE: Hardware items other than specified in this section.
- B. Section 088000 - Glazing: Glass and glazing accessories.

1.03 REFERENCE STANDARDS

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site; 2015.
- B. AAMA 609 & 610 - Cleaning and Maintenance Guide for Architecturally Finished Aluminum (Combined Document); 2015.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum; 2012.
- D. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate; 2014.
- E. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate [Metric]; 2014.
- F. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes; 2014.
- G. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes [Metric]; 2013.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate with installation of other components that comprise the exterior enclosure.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit two samples __12__x__12__ inches in size illustrating finished aluminum surface, glass, infill panels, glazing materials.
- E. Manufacturer's Certificate: Certify that the products supplied meet or exceed the specified requirements.
- F. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- G. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- H. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

1.06 QUALITY ASSURANCE

- A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Structural Engineer experienced in design of this Work and

licensed in Florida.

- B. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of documented experience.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

1.08 FIELD CONDITIONS

- A. Do not install sealants when ambient temperature is less than 40 degrees F. Maintain this minimum temperature during and 48 hours after installation.

1.09 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

PART 2 PRODUCTS

2.01 BASIS OF DESIGN -- FRAMING FOR INSULATING GLAZING (EXTERIOR)

- A. Center-Set Style, Thermally-Broken:
 - 1. Basis of Design: Kawneer; Trifab 451UT.
 - 2. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.

2.02 BASIS OF DESIGN -- SWINGING DOORS

- A. Medium Stile, Monolithic Glazing:
 - 1. Basis of Design: Kawneer, Model 350 Medium Stile Entrance.
 - 2. Thickness: 1-3/4 inches.
- B. Wide Stile, Insulating Glazing, Not Thermally-Broken:
 - 1. Basis of Design: Kawneer; Series 500 Tuffline Wide Stile Door..
- C. Other Manufacturers: Provide either the product identified as "Basis of Design" or an equivalent product of one of the manufacturers listed below:
 - 1. C.R. Laurence Company, Inc; U.S. Aluminum; _____: www.crl-arch.com/#sle.
 - 2. EFCO, a Pella Company; _____: www.efcocorp.com/#sle.
 - 3. YKK AP America Inc; _____: www.ykkap.com/#sle.

2.03 STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
 - 1. Finish: Class I natural anodized.
 - a. Factory finish all surfaces that will be exposed in completed assemblies.
 - b. Touch-up surfaces cut during fabrication so that no natural aluminum is visible in completed assemblies, including joint edges.
 - 2. Finish Color: clear anodized..
 - 3. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
 - 4. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
 - 5. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
 - 6. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without

causing detrimental effect to system components, anchorages, and other building elements.

7. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.
8. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
9. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and inner sheet of infill panel and heel bead of glazing compound.

2.04 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior.
 1. Glazing Stops: Flush.
 2. Cross-Section: As indicated on drawings.
- B. Glazing: As specified in Section 088000.

2.05 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Sheet Aluminum: ASTM B209 (ASTM B209M).
- C. Fasteners: Stainless steel.
- D. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

2.06 FINISHES

- A. Class I Natural Anodized Finish: AAMA 611 AA-M12C22A41 Clear anodic coating not less than 0.7 mils thick.

2.07 HARDWARE

- A. For each door, include weatherstripping, sill sweep strip, and threshold.
- B. Other Door Hardware: As specified in Section 087101.
- C. Weatherstripping: Single exterior pile and interior twin-fin polymeric adjustable astragal pile, continuous and replaceable; provide on all doors.
- D. Sill Sweep Strips: Resilient seal type, of neoprene; provide on all doors.
- E. Threshold: Extruded aluminum, one piece per door opening, ribbed surface; provide on all doors.
- F. Hinges: continuous geared hinge.
- G. Exit Devices: Panic type (specified in Section 087101).
- H. Door Closers: Concealed overhead.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

3.02 INSTALLATION

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.

- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Set thresholds in bed of sealant and secure.
- J. Install hardware using templates provided.
 - 1. See Section 087101 for hardware installation requirements.
- K. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

3.03 TOLERANCES

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

3.04 FIELD QUALITY CONTROL

- A. Provide services of storefront manufacturer's field representative to observe for proper installation of system and submit report.
- B. Repair or replace storefront components that have failed designated field testing, and retest to verify performance conforms to specified requirements.

3.05 ADJUSTING

- A. Adjust operating hardware and sash for smooth operation.

3.06 CLEANING

- A. Remove protective material from pre-finished aluminum surfaces.
- B. Wash down surfaces with a solution of mild detergent in warm water, applied with soft, clean wiping cloths, and take care to remove dirt from corners and to wipe surfaces clean.
- C. Upon completion of installation, thoroughly clean aluminum surfaces in accordance with AAMA 609 & 610.

3.07 PROTECTION

- A. Protect installed products from damage until Date of Substantial Completion.

END OF SECTION 084313

**SECTION 087100.11
DOOR HARDWARE**

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes:
- B. REFERENCES
 - 1. Mechanical and electrified door hardware for:
 - a. Swinging doors.

1.02 REFERENCES

- A. DHI - Door and Hardware Institute
 - 1. Sequence and Format for the Hardware Schedule
 - 2. Recommended Locations for Builders Hardware
 - 3. Key Systems and Nomenclature
- B. ANSI - American National Standards Institute
 - 1. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties

1.03 SUBMITTALS

- A. General:
 - 1. Submit in accordance with Conditions of Contract and Division 01 requirements.
 - 2. Highlight, encircle, or otherwise specifically identify on submittals deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.
 - 3. Prior to forwarding submittal, comply with procedures for verifying existing door and frame compatibility for new hardware, as specified in PART 3, "EXAMINATION" article.
- B. Action Submittals:
 - 1. Product Data: Product data including manufacturers' technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
 - 2. Samples for Verification: If requested by Architect, submit production sample or sample installations of each type of exposed hardware unit in finish indicated, and tagged with full description for coordination with schedule.
 - a. Samples will be returned to supplier in like-new condition. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.
 - 3. Door Hardware Schedule: Submit schedule with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule as published by the Door and Hardware Institute. Indicate complete designations of each item required for each door or opening, include:
 - a. Door Index; include door number, heading number, and Architects hardware set number.
 - b. Opening Lock Function Spreadsheet: List locking device and function for each opening.
 - c. Type, style, function, size, and finish of each hardware item.
 - d. Name and manufacturer of each item.
 - e. Fastenings and other pertinent information.
 - f. Location of each hardware set cross-referenced to indications on Drawings.
 - g. Explanation of all abbreviations, symbols, and codes contained in schedule.
 - h. Mounting locations for hardware.
 - i. Door and frame sizes and materials.
 - j. Name and phone number for local manufacturer's representative for each product.

4. Key Schedule:
 - a. After Keying Conference, provide keying schedule listing levels of keying as well as explanation of key system's function, key symbols used and door numbers controlled.
 - b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
 - c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
 - d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
 - e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion.
 - 1) Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
 - f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.
 5. Templates: After final approval of hardware schedule, provide templates for doors, frames and other work specified to be factory prepared for door hardware installation.
- C. Informational Submittals:
1. Qualification Data: For Supplier, Installer and Architectural Hardware Consultant.
 2. Product Certificates for electrified door hardware, signed by manufacturer:
 - a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
 3. Certificates of Compliance:
 - a. Certificates of compliance for fire-rated hardware and installation instructions if requested by Architect or Authority Having Jurisdiction.
 - b. Installer Training Meeting Certification: Letter of compliance, signed by Contractor, attesting to completion of installer training meeting specified in "QUALITY ASSURANCE" article.
 4. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by qualified testing agency, for door hardware on doors located in accessible routes.
 5. Florida Building Code; Windload: Submit certified independent lab test or NOA report on each type of exterior opening. All exterior opening submittals shall include door number, door and frame elevations and all finish hardware as tested as an assembly. These reports are to be forwarded to the building department.
 6. Warranty: Warranty specified in this Section.
- D. Closeout Submittals:
1. Operations and Maintenance Data : Provide in accordance with Division 01 and include:
 - a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
 - b. Catalog pages for each product.
 - c. Name, address, and phone number of local representative for each manufacturer.
 - d. Parts list for each product.
 - e. Final approved hardware schedule, edited to reflect conditions as-installed.
 - f. Final keying schedule
 - g. Copies of floor plans with keying nomenclature
 - h. Copy of warranties including appropriate reference numbers for manufacturers to identify project.

1.04 QUALITY ASSURANCE

- A. Product Substitutions: Comply with product requirements stated in Division 01 and as specified.

1. Where specific manufacturer's product is named and accompanied by "No Substitute," including make or model number or other designation, provide product specified. (Note: Certain products have been selected for their unique characteristics and particular project suitability.)
 - a. Where no additional products or manufacturers are listed in product category, requirements for "No Substitute" govern product selection.
 2. Where products indicate "acceptable manufacturers", provide product from specified manufacturers, subject to compliance with specified requirements and "Single Source Responsibility" requirements stated.
- B. Supplier Qualifications and Responsibilities: Recognized architectural hardware supplier with record of successful in-service performance for supplying door hardware similar in quantity, type, and quality to that indicated for this Project and that provides certified Architectural Hardware Consultant (AHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
1. Warehousing Facilities: In Project's vicinity.
 2. Scheduling Responsibility: Preparation of door hardware and keying schedules.
 3. Engineering Responsibility: Preparation of data for electrified door hardware, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in assemblies similar to those indicated for this Project.
 - a. Upon completion of electronic security hardware installation, inspect and verify that all components are working properly.
- C. Installer Qualifications: Qualified tradesmen, skilled in application of commercial grade hardware with record of successful in-service performance for installing door hardware similar in quantity, type, and quality to that indicated for this Project.
- D. Architectural Hardware Consultant Qualifications: Person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and meets these requirements:
1. For door hardware, DHI-certified, Architectural Hardware Consultant (AHC).
 2. Can provide installation and technical data to Architect and other related subcontractors.
 3. Can inspect and verify components are in working order upon completion of installation.
 4. Capable of producing wiring diagrams.
 5. Capable of coordinating installation of electrified hardware with Architect and electrical engineers.
- E. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.
- F. Fire-Rated Door Openings: Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction. Provide only items of door hardware that are listed and are identical to products tested by Underwriters Laboratories, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.
- G. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.
- H. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release latch. Locks do not require use of key, tool, or special knowledge for operation.
- I. Accessibility Requirements: For door hardware on doors in an accessible route, comply with governing accessibility regulations cited in "REFERENCES" article, herein.
1. Provide operating devices that do not require tight grasping, pinching, or twisting of wrist and that operate with force of not more than 5 lbf (22.2 N).

2. Maximum opening-force requirements:
 - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
 3. Bevel raised thresholds with slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
 4. Adjust door closer sweep periods so that, from open position of 70 degrees, door will take at least 3 seconds to move to 3 inches (75 mm) from latch, measured to leading edge of door.
- J. Keying Conference: Conduct conference at Project site
1. Attendees: Owner, Contractor, Architect, Installer, and Supplier's Architectural Hardware Consultant.
 2. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
 - a. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - b. Preliminary key system schematic diagram.
 - c. Requirements for key control system.
 - d. Requirements for access control.
 - e. Address for delivery of keys.
- K. Pre-installation Conference: Conduct conference at Project site.
1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 2. Inspect and discuss preparatory work performed by other trades.
- L. Coordination Conferences:
1. Installation Coordination Conference: Prior to hardware installation, schedule and hold meeting to review questions or concerns related to proper installation and adjustment of door hardware.
 - a. Attendees: Door hardware supplier, door hardware installer, Contractor.
 - b. After meeting, provide letter of compliance to Architect, indicating when meeting was held and who was in attendance.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site.
- B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.
 1. Deliver each article of hardware in manufacturer's original packaging.
- C. Project Conditions:
 1. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.
 2. Provide secure lock-up for door hardware delivered to Project, but not yet installed. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.
- D. Protection and Damage:
 1. Promptly replace products damaged during shipping.
 2. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work.
 3. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.
- E. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.
- F. Deliver keys to Owner by registered mail or overnight package service.

1.06 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Direct shipments not permitted, unless approved by Contractor.

1.07 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.
 - 1. Warranty Period: Years from date of Substantial Completion, for durations indicated.
 - a. Closers:
 - 1) Mechanical: 10 years.
 - b. Exit Devices:
 - 1) Mechanical: 3 years.
 - c. Locksets:
 - 1) Mechanical: 10 years.
 - d. Key Blanks: Lifetime
 - 2. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.

1.08 MAINTENANCE

- A. Extra Materials:
 - 1. Furnish 100 ea. Schlage Everest D key blanks
- B. Maintenance Tools:
 - 1. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. The Owner requires use of certain products for their unique characteristics and particular project suitability to insure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "No Substitute."
 - 1. Where "No Substitute" is noted, submittals and substitution requests for other products will not be considered.
- B. Approval of manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category shall be in accordance with QUALITY ASSURANCE article.
- C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.
- D. Hand of Door: Drawings show direction of slide, swing, or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement as shown.
- E. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

- A. Fasteners

1. Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation.
2. Furnish screws for installation with each hardware item. Finish exposed (exposed under any condition) screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners for hardware units exposed when door is closed except when no standard units of type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on opposite face is exposed in other work unless thru-bolts are required to fasten hardware securely. Review door specification and advise Architect if thru-bolts are required.
4. Install hardware with fasteners provided by hardware manufacturer.

2.03 HINGES

- A. Manufacturers and Products:
 1. Scheduled Manufacturer and Product: Ives 5BB series
 2. Acceptable Manufacturers and Products: Hager BB series, Stanley FBB Series
- B. Requirements:
 1. Provide five-knuckle ball bearing hinges conforming to ANSI/BHMA A156.1.
 2. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
 - a. Exterior: Standard weight, bronze or stainless steel, 4-1/2 inches (114 mm) high
 - b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
 3. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
 4. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
 - a. Out-Swinging Exterior Doors: Non-removable pins
 5. Width of hinges: 4-1/2 inches (114 mm) at 1-3/4 inch (44 mm) thick doors.

2.04 FLUSH BOLTS

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives
 2. Acceptable Manufacturers: Hager, Rockwood
- B. Requirements:
 1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.05 COORDINATORS

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives
 2. Acceptable Manufacturers: Hager, Rockwood
- B. Requirements:
 1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
 2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers and surface vertical rod exit device strikes. Factory-prep coordinators for vertical rod devices if required.

2.06 CYLINDRICAL LOCKS – GRADE 1

- A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: Schlage ND Series
 2. Acceptable Manufacturers and Products: No Substitute
- B. Requirements:
1. Provide Schlage ND Series cylindrical locks conforming to the following standards and requirements:
 - a. ANSI/BHMA A156.2 Series 4000, Grade 1.
 - b. UL 10C for 4'-0" x 10'-0" 3-hour fire door.
 - c. Florida Building Code (ASTM E330, E1886, E1996) and Miami Dade (TAS 201, 202, 203) requirements for hurricanes.
 2. Cylinders: Refer to "KEYING" article.
 3. Provide cylindrical locksets exceeding the ANSI/BHMA A156.2 Grade 1 performance standards for strength, security, and durability in the categories below:
 - a. Abusive Locked Lever Torque Test – minimum 3,100 inch-pounds without gaining access
 - b. Offset lever pull – minimum 1,600 foot pounds without gaining access
 - c. Vertical lever impact – minimum 100 impacts without gaining access
 - d. Cycle life - tested to minimum 16 million cycles per ANSI/BHMA A156.2 Cycle Test with no visible lever sag or use of performance aids such as set screws or spacers.
 4. Provide solid steel anti-rotation through bolts and posts to control excessive rotation of lever.
 5. Provide lockset that allows lock function to be changed to over twenty other common functions by swapping easily accessible parts.
 6. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2 inch latch throw capable of UL listing of 3 hours on a 4' x 10' opening. Provide proper latch throw for UL listing at pairs.
 7. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
 8. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
 9. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
 10. Lever Trim: Solid cast levers without plastic inserts, and wrought roses on both sides.
 - a. Lever Design: Schlage Rhodes.

2.07 EXIT DEVICES

- A. Manufacturers and Products:
1. Scheduled Manufacturer and Product: Von Duprin 99 series
 2. Acceptable Manufacturers and Products: No Substitute
- B. Requirements:
1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1, and UL listed for Panic Exit or Fire Exit Hardware. Cylinders: Refer to "KEYING" article, herein.
 2. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
 3. Touchpad: Extend minimum of one half of door width. Match exit device finish, stainless steel for US26, US26D, US28, US32, and US32D finishes; and for all other finishes, provide compatible finish to exit device. No plastic inserts are allowed in touchpads.
 4. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
 5. Provide flush end caps for exit devices.
 6. Provide exit devices with manufacturer's approved strikes.
 7. Provide exit devices cut to door width and height. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
 8. Mount mechanism case flush on face of doors, or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.

9. Provide hex dogging at non-fire-rated exit devices.
10. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
11. Where lever handles are specified as outside trim for exit devices, provide heavy-duty lever trims with forged or cast escutcheon plates. Provide vandal-resistant levers that will travel to 90-degree down position when more than 35 pounds of torque are applied, and which can easily be re-set.
 - a. Lever Style: Match lever style of locksets.

2.08 CYLINDERS

- A. Manufacturers:
 1. Scheduled Manufacturer: Schlage
 2. Acceptable Manufacturers: No substitute
- B. Requirements:
 1. Provide permanent cylinders/cores to match Owner's existing Schlage Everest key system, compliant with ANSI/BHMA A156.5; latest revision, Section 12, Grade 1; permanent cylinders; cylinder face finished to match lockset, manufacturer's series as indicated. Refer to "KEYING" article.

2.09 KEYING

- A. Provide cylinders/cores keyed into Owner's existing Schlage Everest factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.
- B. Requirements:
 1. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
 - a. Master Keying system as directed by the Owner.
 2. Forward biting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements shall be cause for replacement of cylinders/cores involved at no additional cost to Owner.
 3. Provide keys with the following features:
 - a. Everest D keyway
 - b. Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
 4. Identification:
 - a. Mark permanent cylinders/cores and keys with applicable blind code per DHI publication "Keying Systems and Nomenclature" for identification. Blind code marks shall not include actual key cuts.
 - b. Identification stamping provisions must be approved by the Architect and Owner.
 - c. Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE".
 - d. Failure to comply with stamping requirements shall be cause for replacement of keys involved at no additional cost to Owner.
 - e. Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
 5. Quantity: Furnish in the following quantities.
 - a. Change (Day) Keys: 3 per cylinder/core.
 - b. Master Keys: 6.

2.10 KEY CONTROL SYSTEM

- A. Manufacturers:
 1. Scheduled Manufacturer: Telkee
 2. Acceptable Manufacturers: HPC, Lund

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
 - a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
 - b. Provide hinged-panel type cabinet for wall mounting.

2.11 DOOR CLOSERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product: LCN 4040XP series.
2. Acceptable Manufacturers and Products: No Substitute

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers.
2. Provide door closers with fully hydraulic, full rack and pinion action with high strength cylinder, and full complement bearings at shaft.
3. Cylinder Body: 1-1/2 inch (38 mm) diameter with 3/4 inch (19 mm) diameter double heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Provide closers with solid forged steel main arms and factory assembled heavy-duty forged forearms for parallel arm closers.
8. Pressure Relief Valve (PRV) Technology: Not permitted.
9. Finish for Closer Cylinders, Arms, Adapter Plates, and Metal Covers: Powder coating finish which has been certified to exceed 100 hours salt spray testing as described in ANSI Standard A156.4 and ASTM B117, or has special rust inhibitor (SRI).
10. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.12 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Hager, Rockwood

B. Requirements:

1. Provide offset pulls of solid bar stock, diameter and length as scheduled. Where required, mount back to back with push bar.
2. Provide decorative pulls as scheduled. Where required, mount back to back with pull.

2.13 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer: Ives
2. Acceptable Manufacturers: Hager, Rockwood

B. Requirements:

1. Provide kick plates, mop plates, and armor plates minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.

2. Sizes of plates:
 - a. Kick Plates: 12 inches (254 mm) high by 2 inches (51 mm) less width of door on single doors, 1 inch (25 mm) less width of door on pairs

2.14 DOOR STOPS AND HOLDERS

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives
 2. Acceptable Manufacturers: Hager, Rockwood
- B. Provide door stops at each door leaf:
 1. Provide wall stops wherever possible. Provide convex type where mortise type locks are used and concave type where cylindrical type locks are used.
 2. Where a wall stop cannot be used, provide universal floor stops for low or high rise options.
 3. Where wall or floor stop cannot be used, provide medium duty surface mounted overhead stop.

2.15 THRESHOLDS, SEALS, AND GASKETING

- A. Manufacturers:
 1. Scheduled Manufacturer: Zero International
 2. Acceptable Manufacturers: National Guard, Pemko
- B. Requirements:
 1. Provide thresholds, weather-stripping (including door sweeps, seals, and astragals) and gasketing systems (including smoke, sound, and light) as specified and per architectural details. Match finish of other items.
 2. Size of thresholds:
 - a. Bumper Seal Thresholds: 1/2 inch (13 mm) high by 5 inches (127 mm) wide by door width
 3. Provide seals and astragals only of type where resilient or flexible seal strip is easily replaceable and readily available.

2.16 SILENCERS

- A. Manufacturers:
 1. Scheduled Manufacturer: Ives
 2. Acceptable Manufacturers: Hager, Rockwood
- B. Requirements:
 1. Provide "push-in" type silencers for hollow metal or wood frames.
 2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
 3. Omit where gasketing is specified.

2.17 MAGNETIC HOLDERS

- A. Manufacturers:
 1. Scheduled Manufacturer: LCN
 2. Acceptable Manufacturers: Rixson, Sargent
- B. Requirements:
 1. Provide wall mounted electromagnetic door release as specified with minimum of 25 pounds of holding force. Coordinate projection of holder and armature with other hardware and wall conditions to ensure that door sits parallel to wall when fully open. Connect magnetic holders on fire-rated doors into the fire control panel for fail-safe operation.

2.18 FINISHES

- A. General: Refer to the Hardware Groups.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Where on-site modification of doors and frames is required:
 - 1. Carefully remove existing door hardware and components being reused. Clean, protect, tag, and store in accordance with storage and handling requirements specified herein.
 - 2. Field modify and prepare existing door and frame for new hardware being installed.
 - 3. When modifications are exposed to view, use concealed fasteners, when possible.
 - 4. Prepare hardware locations and reinstall in accordance with installation requirements for new door hardware and with:
 - a. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
 - b. Wood Doors: DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
 - c. Doors in rated assemblies: NFPA 80 for restrictions on on-site door hardware preparation.

3.03 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Custom Steel Doors and Frames: HMMA 831.
 - 3. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.
- C. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.
- D. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.
- E. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- F. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.
- G. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- H. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- I. Door Closers: Mount closers on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Closers shall not be visible in corridors, lobbies and other public spaces unless approved by Architect.
- J. Closer/holders: Mount closer/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.
- K. Thresholds: Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

- L. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.
- M. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- N. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

3.04 FIELD QUALITY CONTROL

- A. Architectural Hardware Consultant: Engage qualified independent Architectural Hardware Consultant to perform inspections and to prepare inspection reports.
 - 1. Architectural Hardware Consultant will inspect door hardware and state in each report whether installed work complies with or deviates from requirements, including whether door hardware is properly installed and adjusted.

3.05 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.
- B. Occupancy Adjustment: Approximately six months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors, door hardware, and electrified door hardware.

3.06 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.07 DEMONSTRATION

- A. Provide training for Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes.

3.08 DOOR HARDWARE SCHEDULE

- A. Locksets, exit devices, and other hardware items are referenced in the following hardware sets for series, type and function. Refer to the above-specifications for special features, options, cylinders/keying, and other requirements.

OPT0417868

HARDWARE GROUP NO. 01

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------------------|----------------------|--------|-----|
| 8 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | 689 | VON |
| 1 | EA | FIRE RATED REMOVABLE MULLION | 9954 STAB | 689 | VON |

| | | | | | |
|---|----|------------------------|---|-----|-----|
| 1 | EA | PANIC HARDWARE | 99-EO-SNB | 626 | VON |
| 1 | EA | ELEC PANIC HARDWARE | QEL-99-NL-SNB 24 VDC | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-021 | 626 | SCH |
| 2 | EA | SURFACE CLOSER | 4040XP CUSH TBSRT | 689 | LCN |
| 1 | EA | CARD READER | BY SECURITY PROVIDER | BLK | SCE |
| 2 | EA | DOOR CONTACT | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | MOTION SENSOR | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | POWER SUPPLY | PS902 900-2RS 120/240 VAC | LGR | SCE |
| 1 | | | BALANCE OF HARDWARE BY DOOR SUPPLIER | | |

DOOR NORMALLY CLOSED AND LOCKED. PRESENTATION OF VALID CREDENTIAL UNLOCKS DOOR. FREE EGRESS AT ALL TIMES. UPON LOSS OF POWER DOOR IS CLOSED AND SECURE SIDE IS LOCKED.

HARDWARE GROUP NO. 02

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------------|---|--------|-----|
| 4 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | 689 | VON |
| 1 | EA | ELEC PANIC HARDWARE | QEL-99-NL-SNB 24 VDC | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-021 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP CUSH TBSRT | 689 | LCN |
| 1 | EA | CARD READER | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | DOOR CONTACT | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | MOTION SENSOR | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | POWER SUPPLY | PS902 900-2RS 120/240 VAC | LGR | SCE |
| 1 | | | BALANCE OF HARDWARE BY DOOR SUPPLIER | | |

DOOR NORMALLY CLOSED AND LOCKED. PRESENTATION OF VALID CREDENTIAL UNLOCKS DOOR. FREE EGRESS AT ALL TIMES. UPON LOSS OF POWER DOOR IS CLOSED AND SECURE SIDE IS LOCKED.

HARDWARE GROUP NO. 03

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------------|---------------------------------|--------|-----|
| 5 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | 630 | IVE |
| 1 | EA | ELECTRIC HINGE | 5BB1 4.5 X 4.5 CON TW8 | 630 | IVE |
| 2 | EA | SURFACE BOLT | SB360 12" T | 604 | IVE |
| 1 | EA | EU STOREROOM LOCK | ND80P6DEU RHO RX CON 12V/24V DC | 626 | SCH |
| 1 | EA | COORDINATOR | COR X FL | 628 | IVE |
| 2 | EA | MOUNTING BRACKET | MB | 689 | IVE |
| 2 | EA | SURFACE CLOSER | 4040XP CUSH TBSRT | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | RAIN DRIP | 142AA | AA | ZER |
| 1 | EA | GASKETING | 188SBK PSA | BK | ZER |
| 1 | EA | THRESHOLD | 65A-223 | A | ZER |
| 1 | EA | CARD READER | BY SECURITY PROVIDER | BLK | SCE |
| 2 | EA | DOOR CONTACT | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | POWER SUPPLY | BY SECURITY PROVIDER | LGR | SCE |

ASTRAGAL BY DOOR MANUFACTURER.DOORS NORMALLY CLOSED AND LOCKED. PRESENTATION OF VALID CREDENTIAL UNLOCKS ACTIVE LEAF. FREE EGRESS AT ALL TIMES. UPON LOSS OF POWER DOORS ARE CLOSED AND LOCKED.

HARDWARE GROUP NO. 04

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------------------|----------------------|--------|-----|
| 6 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | 689 | VON |
| 1 | EA | FIRE RATED REMOVABLE MULLION | 9954 STAB | 689 | VON |

| | | | | | |
|---|----|------------------------|------------------------------|-----|-----|
| 1 | EA | PANIC HARDWARE | 99-EO-SNB | 626 | VON |
| 1 | EA | ELEC PANIC HARDWARE | QEL-99-NL-SNB 24 VDC | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-021 | 626 | SCH |
| 2 | EA | SURFACE CLOSER | 4040XP CUSH TBSRT | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | RAIN DRIP | 142AA | AA | ZER |
| 2 | EA | GASKETING | 188SBK PSA | BK | ZER |
| 1 | EA | THRESHOLD | 65A-223 | A | ZER |
| 1 | EA | CARD READER | BY SECURITY PROVIDER | BLK | SCE |
| 2 | EA | DOOR CONTACT | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | MOTION SENSOR | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | POWER SUPPLY | PS902 900-2RS 120/240 VAC | LGR | SCE |

DOORS NORMALLY CLOSED AND LOCKED. PRESENTATION OF VALID CREDENTIAL UNLOCKS ACTIVE LEAF. FREE EGRESS AT ALL TIMES. UPON LOSS OF POWER DOORS ARE CLOSED AND SECURE SIDE IS LOCKED.

HARDWARE GROUP NO. 05

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|---------------------|---------------------------|--------|-----|
| 6 | EA | HINGE | 5BB1 4.5 X 4.5 NRP | 630 | IVE |
| 2 | EA | SURFACE BOLT | SB360 12" T | 604 | IVE |
| 1 | EA | COORDINATOR | COR X FL | 628 | IVE |
| 2 | EA | MOUNTING BRACKET | MB F | 689 | IVE |
| 2 | EA | SURFACE CLOSER | 4040XP CUSH TBSRT | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | RAIN DRIP | 142AA | AA | ZER |
| 1 | EA | GASKETING | 188SBK PSA | BK | ZER |
| 1 | EA | THRESHOLD | 65A-223 | A | ZER |

ASTRAGAL BY DOOR MANUFACTURER.

HARDWARE GROUP NO. 06

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|--|-------------|-------------------|--------|-----|
|-----|--|-------------|-------------------|--------|-----|

| | | | | | |
|---|----|-------------------------|-------------------------|-----|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 NRP | 630 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | 689 | VON |
| 1 | EA | ELEC FIRE EXIT HARDWARE | QEL-99-NL-F-SNB- 24 VDC | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-021 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP CUSH TBSRT | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | RAIN DRIP | 142AA | AA | ZER |
| 1 | EA | GASKETING | 188SBK PSA | BK | ZER |
| 1 | EA | THRESHOLD | 65A-223 | A | ZER |
| 1 | EA | CARD READER | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | DOOR CONTACT | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | MOTION SENSOR | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | POWER SUPPLY | BY SECURITY PROVIDER | LGR | SCE |

PRESENTATION OF VALID CREDENTIAL UNLOCKS DOOR. FREE EGRESS AT ALL TIMES. UPON LOSS OF POWER DOOR IS CLOSED AND SECURE SIDE IS LOCKED.

HARDWARE GROUP NO. 07

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|------------------------------|-------------------------------|--------|-----|
| 8 | EA | HINGE | 5BB1HW 4.5 X 4.5 | 652 | IVE |
| 1 | EA | FIRE RATED REMOVABLE MULLION | 9954 STAB | 689 | VON |
| 1 | EA | PANIC HARDWARE | 99-EO-SNB | 626 | VON |
| 1 | EA | PANIC HARDWARE | 99-L-NL-06-SNB | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-021 | 626 | SCH |
| 2 | EA | SURFACE CLOSER | 4040XP REG OR PA AS REQ TBSRT | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 2 | EA | GASKETING | 488SBK PSA | BK | ZER |

HARDWARE GROUP NO. 08

PROVIDE EACH UEP DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|---------------------|-------------------------------|--------|-----|
| 6 | EA | HINGE | 5BB1HW 4.5 X 4.5 | 652 | IVE |
| 1 | EA | POWER TRANSFER | EPT10 | 689 | VON |
| 1 | EA | MANUAL FLUSH BOLT | FB458 | 626 | IVE |
| 1 | EA | ELEC PANIC HARDWARE | QEL-99-L-NL-06-SNB- 24 VDC | 626 | VON |
| 1 | EA | RIM CYLINDER | 20-021 | 626 | SCH |
| 1 | EA | COORDINATOR | COR X FL | 628 | IVE |
| 2 | EA | MOUNTING BRACKET | MB | 689 | IVE |
| 2 | EA | SURFACE CLOSER | 4040XP REG OR PA AS REQ TBSRT | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 2 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | POWER SUPPLY | PS902 900-2RS 120/240 VAC | LGR | SCE |

ASTRAGAL BY DOOR MANUFACTURER.DOOR NORMALLY CLOSED AND LOCKED. PRESENTATION OF VALID CREDENTIAL UNLOCKS DOOR. FREE EGRESS AT ALL TIMES. UPON LOSS OF POWER DOOR IS CLOSED AND SECURE SIDE IS LOCKED.

HARDWARE GROUP NO. 09

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|-------------------------------|--------|-----|
| 8 | EA | HINGE | 5BB1HW 4.5 X 4.5 | 652 | IVE |
| 2 | EA | PANIC HARDWARE | 9927-EO-LBR | 626 | VON |
| 2 | EA | SURFACE CLOSER | 4040XP REG OR PA AS REQ TBSRT | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 2 | EA | MAGNET | SEM7830 12V/24V/120V | 689 | LCN |
| 2 | EA | GASKETING | 328AA-S | AA | ZER |

MAGNETIC HOLD OPEN TIED INTO THE FIRE ALARM SYSTEM.

HARDWARE GROUP NO. 10

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------------|---------------------------------|--------|-----|
| 5 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | ELECTRIC HINGE | 5BB1 4.5 X 4.5 CON TW8 | 652 | IVE |
| 1 | EA | MANUAL FLUSH BOLT | FB458 | 626 | IVE |
| 1 | EA | EU STOREROOM LOCK | ND80P6DEU RHO RX CON 12V/24V DC | 626 | SCH |
| 1 | EA | COORDINATOR | COR X FL | 628 | IVE |
| 2 | EA | MOUNTING BRACKET | MB | 689 | IVE |
| 2 | EA | SURFACE CLOSER | 4040XP CUSH TBSRT | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | CARD READER | BY SECURITY PROVIDER | BLK | SCE |
| 2 | EA | DOOR CONTACT | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | POWER SUPPLY | BY SECURITY PROVIDER | LGR | SCE |

ASTRAGAL BY DOOR MANUFACTURER.DOORS NORMALLY CLOSED AND LOCKED. PRESENTATION OF VALID CREDENTIAL UNLOCKS ACTIVE LEAF. FREE EGRESS AT ALL TIMES. UPON LOSS OF POWER DOORS ARE CLOSED AND LOCKED.

HARDWARE GROUP NO. 11 - NOT USED

HARDWARE GROUP NO. 12

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------------|-------------------------------|--------|-----|
| 6 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | MANUAL FLUSH BOLT | FB458 | 626 | IVE |
| 1 | EA | STOREROOM LOCK | ND80P6D RHO | 626 | SCH |
| 1 | EA | COORDINATOR | COR X FL | 628 | IVE |
| 2 | EA | SURFACE CLOSER | 4040XP REG OR PA AS REQ TBSRT | 689 | LCN |
| 2 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 2 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

ASTRAGAL BY DOOR MANUFACTURER.

HARDWARE GROUP NO. 13

PROVIDE EACH PR DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------------|----------------|--------|-----|
| 6 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | MANUAL FLUSH BOLT | FB458 | 626 | IVE |
| 1 | EA | STOREROOM LOCK | ND80P6D RHO | 626 | SCH |
| 1 | EA | COORDINATOR | COR X FL | 628 | IVE |
| 2 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 2 | EA | SILENCER | SR64 | GRY | IVE |

ASTRAGAL BY DOOR MANUFACTURER.

HARDWARE GROUP NO. 14

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|-------------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PANIC HARDWARE | LD-99-L-2-06-SNB | 626 | VON |
| 2 | EA | RIM CYLINDER | 20-021 | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP REG OR PA AS REQ TBSRT | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

HARDWARE GROUP NO. 15

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|-------------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PANIC HARDWARE | 99-L-BE-06-SNB- | 626 | VON |
| 1 | EA | SURFACE CLOSER | 4040XP REG OR PA AS REQ TBSRT | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

HARDWARE GROUP NO. 16

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|-------------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | ND70P6D RHO | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP REG OR PA AS REQ TBSRT | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

HARDWARE GROUP NO. 17

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|----------------|--------|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | CLASSROOM LOCK | ND70P6D RHO | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

HARDWARE GROUP NO. 18

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------------|---------------------------------|--------|-----|
| 2 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | ELECTRIC HINGE | 5BB1 4.5 X 4.5 CON TW8 | 652 | IVE |
| 1 | EA | EU STOREROOM LOCK | ND80P6DEU RHO RX CON 12V/24V DC | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP REG OR PA AS REQ TBSRT | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | CARD READER | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | DOOR CONTACT | BY SECURITY PROVIDER | BLK | SCE |
| 1 | EA | POWER SUPPLY | BY SECURITY PROVIDER | LGR | SCE |

DOOR NORMALLY CLOSED AND LOCKED. PRESENTATION OF VALID CREDENTIAL UNLOCKS DOOR. FREE EGRESS AT ALL TIMES. UPON LOSS OF POWER DOOR IS CLOSED AND SECURE SIDE IS LOCKED.

HARDWARE GROUP NO. 19

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|-------------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | STOREROOM LOCK | ND80P6D RHO | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP REG OR PA AS REQ TBSRT | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

HARDWARE GROUP NO. 20

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | STOREROOM LOCK | ND80P6D RHO | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP CUSH TBSRT | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

HARDWARE GROUP NO. 21

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|-------------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PUSH PLATE | 8200 4" X 16" | 630 | IVE |
| 1 | EA | PULL PLATE | 8302 10" 4" X 16" | 630 | IVE |
| 1 | EA | SURFACE CLOSER | 4040XP REG OR PA AS REQ TBSRT | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

HARDWARE GROUP NO. 22

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|--------------|----------------|--------|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PRIVACY LOCK | ND40S RHO | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 3 | EA | SILENCER | SR64 | GRY | IVE |

HARDWARE GROUP NO. 23

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|-------------------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PRIVACY LOCK | ND40S RHO | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP REG OR PA AS REQ TBSRT | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 12" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

HARDWARE GROUP NO. 24

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|----------------|-------------------------------------|--------|-----|
| 3 | EA | HINGE | 5BB1HW 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PASSAGE SET | ND10S RHO | 626 | SCH |
| 1 | EA | SURFACE CLOSER | 4040XP REG OR PA AS REQ TBSRT | 689 | LCN |
| 1 | EA | KICK PLATE | 8400 8" X 2" LDW B-CS | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |

HARDWARE GROUP NO. 25

PROVIDE EACH SGL DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|-----|----|-------------|----------------|--------|-----|
| 3 | EA | HINGE | 5BB1 4.5 X 4.5 | 652 | IVE |
| 1 | EA | PASSAGE SET | ND10S RHO | 626 | SCH |
| 1 | EA | WALL STOP | WS406/407CCV | 630 | IVE |
| 1 | EA | GASKETING | 488SBK PSA | BK | ZER |
| 1 | EA | DOOR BOTTOM | 369AA | AA | ZER |

HARDWARE GROUP NO. 26

PROVIDE EACH RU DOOR(S) WITH THE FOLLOWING:

| QTY | | DESCRIPTION | CATALOG NUMBER | FINISH | MFR |
|------------|--|--------------------|--|---------------|------------|
| 1 | | | HARDWARE BY DOOR MANUFACTURER | | |

END OF SECTION 087100.11

This page intentionally left blank

**SECTION 088000
GLAZING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Insulating glass units.
- B. Glazing units, monolithic.
- C. Glazing compounds.

1.02 REFERENCE STANDARDS

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings, Safety Performance Specifications and Methods of Test; 2010.
- C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures; 2010, with 2013 Supplements and Errata.
- D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers; 2005 (Reapproved 2011).
- E. ASTM C920 - Standard Specification for Elastomeric Joint Sealants; 2014.
- F. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- G. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass; 2012.
- H. ASTM C1172 - Standard Specification for Laminated Architectural Flat Glass; 2014.
- I. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- J. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass; 2015.
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- L. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings; 2012a.
- M. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation; 2010.
- N. GANA (SM) - GANA Sealant Manual; 2008.
- O. IGMA TM-3000 - North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial & Residential Use; 1990 (Reaffirmed 2016).
- P. NFRC 100 - Procedure for Determining Fenestration Product U-factors; 2014.
- Q. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence; 2014, with Errata (2017).
- R. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems; 2017.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data on Insulating Glass Unit, Glazing Unit, Plastic Sheet Glazing Unit, Plastic Film, and _____ Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.

- D. Samples: Submit two samples 8 by ____ inch in size of glass units.
- E. Certificate: Certify that products of this section meet or exceed specified requirements.
- F. Manufacturer's qualification statement.
- G. Installer's qualification statement.
- H. Warranty Documentation: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least 10 years documented experience.

1.05 MOCK-UPS

- A. Provide on-site glazing mock-up with the specified glazing components.
- B. Locate where directed.

1.06 FIELD CONDITIONS

- A. Do not install glazing when ambient temperature is less than 40 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals for additional warranty requirements.
- B. Insulating Glass Units: Provide a ten (10) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.
- C. Laminated Glass: Provide a ten (10) year manufacturer warranty to include coverage for delamination, including providing products to replace failed units.
- D. Polycarbonate Sheet Glazing: Provide a ten (10) year manufacturer warranty to include coverage for breakage, coating failure, abrasion resistance, including providing products to replace failed units.
- E. Heat Soaked Tempered Glass: Provide a ten (10) year manufacturer warranty to include coverage for spontaneous breakage of fully tempered glass caused by nickel sulfide (NiS) inclusions.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Float Glass Manufacturers:
 - 1. AGC Glass North America, Inc; ____: www.agcglass.com/#sle.
 - 2. Cardinal Glass Industries; ____: www.cardinalcorp.com/#sle.
 - 3. Pilkington North America Inc; ____: www.pilkington.com/na/#sle.
 - 4. Vitro Architectural Glass (formerly PPG Glass); ____: www.vitroglazings.com/#sle.
- B. Laminated Glass Manufacturers:
 - 1. Cardinal Glass Industries; ____: www.cardinalcorp.com/#sle.
 - 2. Viracon, Architectural Glass segment of Apogee Enterprises, Inc; ____: www.viracon.com/#sle.
- C. Fire-Resistance-Rated Glass: Provide products as required to achieve indicated fire-rating period.
 - 1. SAFTIFIRST, a division of O'Keeffe's Inc; SuperLite II-XL: www.safti.com/#sle.
 - 2. Technical Glass Products; Pilkington Pyrostop: www.fireglass.com/#sle.

2.02 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
 - 1. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
 - 2. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
 - 3. Glass thicknesses listed are minimum.
- B. Weather-Resistive Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure water-resistive barrier, vapor retarder, and/or air barrier.
 - 1. In conjunction with weather barrier related materials described in other sections, as follows:
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
 - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
 - 3. Solar Optical Properties: Comply with NFRC 300 test method.

2.03 GLASS MATERIALS

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
 - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
 - 2. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
 - 3. Heat-Soak Testing (HST): Provide HST of fully tempered glass used on high-risk or other demanding applications of project, to reduce risks of spontaneous breakage due to nickel sulfide (NiS) induced fractures in accordance with industry established testing requirements.
- B. Laminated Glass: Float glass laminated in accordance with ASTM C1172.
 - 1. Laminated Safety Glass: Complies with ANSI Z97.1 - Class B or 16 CFR 1201 - Category I impact test requirements.

2.04 BASIS OF DESIGN - INSULATING GLASS UNITS

- A. Basis of Design - Insulating Glass Units: Vision glazing, with low-e coating.
 - 1. Applications: Exterior insulating glass glazing unless otherwise indicated.
 - 2. Space between lites filled with argon.
 - 3. Total Thickness: 1 inch.
 - 4. Thermal Transmittance (U-Value), Fixed Fenestration: 0.50, nominal.
 - 5. Thermal Transmittance (U-Value), Entrance Doors: 0.83, nominal.
 - 6. Durability: Certified by an independent testing agency to comply with ASTM E2190.
 - 7. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
 - 8. Metal Edge Spacers: Aluminum, manufacturer's standard corners.
 - 9. Spacer Color: Black.
 - 10. Edge Seal:
 - a. Dual-Sealed System: Provide polyisobutylene sealant as primary seal applied between spacer and glass panes, and silicone or polyurethane sealant as secondary seal applied around perimeter.
 - 11. Color: Black.
 - 12. Purge interpane space with argon gas, hermetically sealed.

13. 1" Insulated Glass
 - a. Basis of Design - Vitro Architectural Glass: www.vitroglazings.com/#sle.
 - 1) Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
 - 2) Reflective Coating: Vitro Architectural Glass Solarcool #1 surface.
 - 3) Glass Tint: Solargray (light-gray).
 - b. Inboard Lite: Annealed float glass, 1/4 inch thick.
 - 1) Low-E Coating: Vitro Architectural Glass Solarban 60 on #3 surface.
 - 2) Glass tint: Clear.
14. 1" Insulated /Tempered Glass
 - a. Basis of Design - Vitro Architectural Glass: www.vitroglazings.com/#sle.
 - 1) Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
 - 2) Reflective Coating: Vitro Architectural Glass Solarcool #1 surface.
 - 3) Glass Tint: Solargray (light gray).
 - b. Inboard Lite: Fully tempered float glass, 1/4 inch thick.
 - 1) Low-E Coating: Vitro Architectural Glass Solarban 60 on #3 surface.
 - 2) Glass tint: Clear.

2.05 GLAZING UNITS

- A. Monolithic Interior Vision Glazing:
 1. Applications: As scheduled.
 2. Glass Type: Annealed float glass.
 3. Tint: Clear.
 4. Thickness: 1/4 inch, nominal.
- B. Monolithic and Tempered Interior Vision Glazing
 1. Applications: As scheduled.
 2. Glass Type: Fully tempered float glass
 3. Tint: Clear.
 4. Thickness: 1/4 inch, nominal.
- C. Security Glazing: Laminated glass, 2-Ply.
 1. Applications: Locations as indicated on drawings.
 2. Tint: Clear.
 3. Thickness: 9/16 inch.
 4. Outer Lite: Heat-strengthened glass.
 5. Interlayer: Polyvinyl butyral (PVB), thickness as required to meet performance criteria.
 6. Inside Lite: Heat-strengthened glass.

2.06 GLAZING COMPOUNDS

- A. Butyl Sealant: Single component; ASTM C920 Grade NS, Class 12-1/2, Uses M and A, Shore A hardness of 10 to 20; black color.
- B. Type GC-5 - Silicone Sealant: Single component; neutral curing; capable of water immersion without loss of properties; non-bleeding, non-staining; ASTM C920 Type S, Grade NS, Class 25, Uses M, A, and G; with cured Shore A hardness range of 15 to 25; _____ color.

2.07 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Spacer Shims: Neoprene, 50 to 60 Shore A durometer hardness; ASTM C864 Option II. Minimum 3 inch long by one half the height of the glazing stop by thickness to suit application, self adhesive on one face.
- C. Glazing Tape, Back Bedding Mastic Type: Preformed, butyl-based, 100 percent solids compound with integral resilient spacer rod applicable to application indicated; 5 to 30 cured Shore A durometer hardness; coiled on release paper; black color.

- D. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.
- E. Glazing Clips: Manufacturer's standard type.

PART 3 EXECUTION

3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.
- C. Verify that sealing between joints of glass framing members has been completed effectively.
- D. Proceed with glazing system installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

3.03 INSTALLATION, GENERAL

- A. Install glazing in compliance with written instructions of glass, gaskets, and other glazing material manufacturers, unless more stringent requirements are indicated, including those in glazing referenced standards.
- B. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- C. Do not exceed edge pressures around perimeter of glass lites as stipulated by glass manufacturer.
- D. Set glass lites of system with uniform pattern, draw, bow, and similar characteristics.
- E. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.
- F. Prevent glass from contact with any contaminating substances that may be the result of construction operations such as, and not limited to the following; weld splatter, fire-safing, plastering, mortar droppings, etc.

3.04 FIELD QUALITY CONTROL

- A. Glass and Glazing product manufacturers to provide field surveillance of the installation of their products.
- B. Monitor and report installation procedures and unacceptable conditions.

3.05 CLEANING

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove nonpermanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

3.06 PROTECTION

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.

- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

END OF SECTION 088000

**SECTION 088300
MIRRORS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Glass mirrors.
 - 1. Annealed float glass.

1.02 REFERENCE STANDARDS

- A. ASTM C1036 - Standard Specification for Flat Glass; 2011.
- B. ASTM C1193 - Standard Guide for Use of Joint Sealants; 2013.
- C. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror; 2008 (Reapproved 2013).
- D. GANA (TIPS) - Mirrors: Handle with Extreme Care (Tips for the Professional on the Care and Handling of Mirrors); 2011.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data on Mirror Types: Submit structural, physical and environmental characteristics, size limitations, special handling and installation requirements.
- C. Manufacturer's Certificate: Certify that mirrors, meets or exceeds specified requirements.
- D. Warranty: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Mirror Glazing: One of each type and size.

1.04 QUALITY ASSURANCE

- A. Fabricate, store, transport, receive, install, and clean mirrors in accordance with recommendations of GANA (TIPS).

1.05 FIELD CONDITIONS

- A. Do not install mirrors when ambient temperature is less than 50 degrees F.
- B. Maintain minimum ambient temperature before, during and 24 hours after installation of glazing compounds.

1.06 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for reflective coating on mirrors and replacement of same.

PART 2 PRODUCTS

2.01 MANUFACTURERS

2.02 MATERIALS

- A. Mirror Design Criteria: Select materials and/or provide supports as required to limit mirror material deflection to 1/200, or to the flexure limit of glass, with full recovery of glazing materials, whichever is less.
- B. Mirror Glass: Clear, annealed float glass; ASTM C1036, with copper and silver coatings, and protective overcoating.
 - 1. Thickness: 1/4 inch.
 - 2. Size: As noted on drawings.

2.03 ACCESSORIES

- A. Mirror Attachment Accessories: Stainless steel clips.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that openings for mirrored glazing are correctly sized and within tolerance.
- B. Verify that surfaces of mirror frames or recesses are clean, free of obstructions, and ready for installation of mirrors.

3.02 PREPARATION

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous mirror frames or recesses with substrate compatible primer or sealer. Prime surfaces scheduled to receive sealant.
- C. Prepare installation in accordance with ASTM C1193 for solvent release sealants, and install sealant in accordance with manufacturer's instructions.

3.03 INSTALLATION

- A. Install mirrors in accordance with GANA (TIPS) and manufacturers recommendations.
- B. Set mirrors plumb and level, and free of optical distortion.
- C. Set mirrors with edge clearance free of surrounding construction including countertops or backsplashes.
- D. Frameless Mirrors: Set mirrors with clips, and anchor rigidly to wall construction.

3.04 CLEANING

- A. Remove labels after work is complete.
- B. Clean mirrors and adjacent surfaces.

END OF SECTION 088300

**SECTION 092116
GYPSUM BOARD ASSEMBLIES**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Performance criteria for gypsum board assemblies.
- B. Metal stud wall framing.
- C. Metal channel ceiling framing.
- D. Acoustic insulation.
- E. Gypsum sheathing.
- F. Cementitious backing board.
- G. Gypsum wallboard.
- H. Joint treatment and accessories.

1.02 RELATED REQUIREMENTS

- A. Section 061000 - Rough Carpentry: Wood blocking product and execution requirements.

1.03 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel; 2014.
- C. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- D. ASTM A1003/A1003M - Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members; 2015.
- E. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board; 2015.
- F. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- G. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing; 2012.
- H. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- I. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board; 2013.
- J. ASTM C954 - Standard Specification for Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs From 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness; 2018.
- K. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- L. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base; 2014a.
- M. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing; 2013.
- N. ASTM C1178/C1178M - Standard Specification for Coated Glass Mat Water-Resistant Gypsum Backing Panel; 2013.
- O. ASTM C1396/C1396M - Standard Specification for Gypsum Board; 2014.
- P. ASTM C1629/C1629M - Standard Classification for Abuse-Resistant Nondecorated Interior Gypsum Panel Products and Fiber-Reinforced Cement Panels; 2015.

- Q. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber; 2012.
- R. ASTM E90 - Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements; 2009.
- S. ASTM E413 - Classification for Rating Sound Insulation; 2010.
- T. GA-216 - Application and Finishing of Gypsum Board; 2013.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.

PART 2 PRODUCTS

2.01 GYPSUM BOARD ASSEMBLIES

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
- B. Interior Partitions: Provide completed assemblies with the following characteristics:
 - 1. Acoustic Attenuation: STC of 45-49 calculated in accordance with ASTM E413, based on tests conducted in accordance with ASTM E90.
- C. Fire Rated Assemblies: Provide completed assemblies as indicated on drawings.
 - 1. UL Assembly Numbers: Provide construction equivalent to that listed for the particular assembly in the current UL (FRD).

2.02 METAL FRAMING MATERIALS

- A. Manufacturers - Metal Framing, Connectors, and Accessories:
 - 1. Clarkwestern Dietrich Building Systems LLC: www.clarkdietrich.com.
 - 2. Marino: www.marinoware.com.
 - 3. Phillips Manufacturing Company: www.phillipsmfg.com.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
 - 1. Studs: "C" shaped with flat or formed webs with knurled faces.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Ceiling Channels: C-shaped, Slotted when connected to deflection - prime structure above.
 - 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.
 - 5. Resilient Furring Channels: 1/2 inch depth, for attachment to substrate through both legs; both legs expanded metal mesh.
 - a. Products:
 - 1) Same manufacturer as other framing materials.
 - 2) Substitutions: See Section 016000 - Product Requirements.
- C. Shaft Wall Studs and Accessories: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 and specified performance requirements.
 - 1. Products:
 - a. Same manufacturer as other framing materials.

- D. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
- E. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
 - 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
 - 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot dipped galvanized coating.
 - 3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
 - 4. Deflection and Firestop Track:
 - a. Provide mechanical anchorage devices as described above that accommodate deflection while maintaining the fire-rating of the wall assembly.
 - b. Products:
 - 1) FireTrak Corporation; Posi Klip.
 - 2) Metal-Lite, Inc; The System.
- F. Preformed Top Track Firestop Seal:
 - 1. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
 - 2. Products:
 - a. Hilti, Inc; Top Track Seal CFS TTS: www.us.hilti.com/#sle.
- G. Non-Loadbearing Framing Accessories:
 - 1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
 - 2. Partial Height Wall Framing Support: Provides stud reinforcement and anchored connection to floor.
 - a. Materials: ASTM A36/A36M formed sheet steel support member with factory-welded ASTM A1003/A1003M steel plate base.
 - 3. Framing Connectors: ASTM A653/A653M G90 galvanized steel clips; secures cold rolled channel to wall studs for lateral bracing.

2.03 BOARD MATERIALS

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
 - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
 - 2. At Assemblies Indicated with Fire-Rating: Use type required by indicated tested assembly; if no tested assembly is indicated, use Type X board, UL or WH listed.
 - 3. Thickness:
 - a. Vertical Surfaces: 1/2 inch.
 - b. Ceilings: 5/8 inch.
 - c. Multi-Layer Assemblies: Thicknesses as indicated on drawings.
 - 4. Paper-Faced Products:
 - a. American Gypsum Company; LightRoc Gypsum Wallboard.
 - b. American Gypsum Company; FireBloc Type X Gypsum Wallboard.
 - c. Georgia-Pacific Gypsum; ToughRock.
 - d. Georgia-Pacific Gypsum; ToughRock Fireguard X.
 - e. Substitutions: See Section 016000 - Product Requirements.
- B. Impact Resistant Wallboard:
 - 1. Application: High-traffic areas indicated.
 - 2. Surface Abrasion: Level 3, minimum, when tested in accordance with ASTM C1629/C1629M.
 - 3. Indentation: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.

4. Hard Body Impact: Level 2, minimum, when tested in accordance with ASTM C1629/C1629M.
 5. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 6. Type: Fire resistance rated Type X, UL or WH listed.
 7. Thickness: 5/8 inch.
 8. Edges: Tapered.
- C. Backing Board For Wet Areas: One of the following products:
1. Application: Surfaces behind tile in wet areas including tub and shower surrounds.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Glass Mat Faced Board: Coated glass mat water-resistant gypsum backing panel as defined in ASTM C1178/C1178M.
 - a. Regular Type: Thickness 1/2 inch.
 - b. Fire Resistant Type: Type X core, thickness 5/8 inch.
 - c. Products:
 - 1) Georgia-Pacific Gypsum; DensShield Tile Backer.
 - 2) National Gypsum Company; Gold Bond eXP Tile Backer.
- D. Ceiling Board: Special sag resistant gypsum ceiling board as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
1. Application: Ceilings, unless otherwise indicated.
 2. Thickness: 1/2 inch.
 3. Edges: Tapered.
- E. Acoustical Sound Dampening Wall and Ceiling Board: Two layers of heavy paper faced, high density gypsum board separated by a viscoelastic polymer layer and capable of achieving STC rating of 50 or more in typical stud wall assemblies as calculated in accordance with ASTM E413 and when tested in accordance with ASTM E90.
1. Thickness: 5/8 inch.
 2. Long Edges: Tapered.
 3. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
- F. Exterior Sheathing Board: Sizes to minimize joints in place; ends square cut.
1. Application: Exterior sheathing, unless otherwise indicated.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Glass Mat Faced Sheathing: Glass mat faced gypsum substrate as defined in ASTM C1177/C1177M.
 4. Core Type: Regular and Type X, as indicated.
 5. Type X Thickness: 5/8 inch.
 6. Regular Board Thickness: 5/8 inch.
 7. Edges: Square.
 8. Glass Mat Faced Products:
 - a. American Gypsum Company; M-Glass Exterior Sheathing Type X.
 - b. American Gypsum Company; M-Glass Exterior Sheathing.
 - c. Georgia-Pacific Gypsum; DensGlass Sheathing.
 - d. Georgia-Pacific Gypsum; DensGlass Fireguard Sheathing.
 - e. Substitutions: See Section 016000 - Product Requirements.
- G. Shaftwall and Coreboard: Type X; 1 inch thick by 24 inches wide, beveled long edges, ends square cut.
1. Paper-Faced Type: Gypsum shaftliner board or gypsum coreboard as defined ASTM C1396/C1396M; water-resistant faces.
 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
 3. Products:
 - a. American Gypsum Company; Shaft Liner.
 - b. Georgia-Pacific Gypsum; ToughRock Shaftliner.

- c. Substitutions: See Section 016000 - Product Requirements.

2.04 ACCESSORIES

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: 3 inch.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
 - 1. Products:
 - a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: www.titebond.com/#sle.
 - b. Substitutions: See Section 016000 - Product Requirements.
- C. Joint Accessories: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
 - 1. Architectural Reveal Beads:
 - a. Shapes: As indicated on drawings.
 - b. Products:
 - 1) Fryreglet; "F" Reveal Model FDM-625-50 and FDM-625-100 : www.fryreglet.com
 - 2. Expansion Joints:
 - a. Type: V-shaped metal with factory-installed protective tape.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
- E. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inch in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion resistant.
- F. Screws for Fastening of Gypsum Panel Products to Steel Members from 0.033 to 0.112 inch in Thickness: ASTM C954; steel drill screws, corrosion resistant.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that project conditions are appropriate for work of this section to commence.

3.02 SHAFT WALL INSTALLATION

- A. Shaft Wall Framing: Install in accordance with manufacturer's installation instructions.

3.03 FRAMING INSTALLATION

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
 - 1. Level ceiling system to a tolerance of 1/1200.
 - 2. Laterally brace entire suspension system.
 - 3. Install bracing as required at exterior locations to resist wind uplift.
- C. Studs: Space studs as indicated.
 - 1. Extend partition framing to structure where indicated and to ceiling in other locations.
 - 2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
 - 3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

- E. Standard Wall Furring: Install at concrete walls scheduled to receive gypsum board, not more than 4 inches from floor and ceiling lines and abutting walls. Secure in place on alternate channel flanges at maximum 16 inches on center.
 - 1. Spacing: As indicated.
- F. Acoustic Furring: Install resilient channels at maximum 24 inches on center. Locate joints over framing members.
- G. Furring for Fire Ratings: Install as required for fire resistance ratings indicated U.L. Assembly requirements..
- H. Blocking: Install wood blocking for support of:
 - 1. Framed openings.
 - 2. Wall mounted cabinets.
 - 3. Plumbing fixtures.
 - 4. Toilet partitions.
 - 5. Toilet accessories.
 - 6. Wall mounted door hardware.

3.04 ACOUSTIC ACCESSORIES INSTALLATION

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Sound Isolation Tape: Apply to vertical studs and top and bottom tracks/runners in accordance with manufacturer's instructions.
- C. Acoustic Sealant: Install in accordance with manufacturer's instructions.

3.05 BOARD INSTALLATION

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Single-Layer Non-Rated: Install gypsum board in most economical direction, with ends and edges occurring over firm bearing.
- C. Double-Layer Non-Rated: Use gypsum board for first layer, placed parallel to framing or furring members, with ends and edges occurring over firm bearing. Use glass mat faced gypsum board at exterior walls and at other locations as indicated. Place second layer perpendicular to framing or furring members. Offset joints of second layer from joints of first layer.
- D. Fire-Rated Construction: Install gypsum board in strict compliance with requirements of assembly listing.
- E. Exterior Sheathing: Comply with ASTM C1280. Install sheathing vertically, with edges butted tight and ends occurring over firm bearing.
 - 1. Seal joints, cut edges, and holes with water-resistant sealant.
- F. Exterior Soffits: Install exterior soffit board perpendicular to framing, with staggered end joints over framing members or other solid backing.
 - 1. Seal joints, cut edges, and holes with water resistant sealant.

3.06 INSTALLATION OF TRIM AND ACCESSORIES

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
 - 1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.
- D. Decorative Trim: Install at locations shown on drawings and in accordance with manufacturer's instructions.

3.07 JOINT TREATMENT

- A. Glass Mat Faced Gypsum Board and Exterior Glass Mat Faced Sheathing: Use fiberglass joint tape, embed and finish with setting type joint compound.
- B. Paper Faced Gypsum Board: Use paper joint tape, embed with drying type joint compound and finish with drying type joint compound.
- C. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
 - 1. Level 5: Walls and ceilings to receive semi-gloss or gloss paint finish and other areas specifically indicated.
 - 2. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
 - 3. Level 1: Fire rated wall areas above finished ceilings, whether or not accessible in the completed construction.
- D. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
 - 1. Feather coats of joint compound so that camber is maximum 1/32 inch.
 - 2. Taping, filling, and sanding is not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.
 - 3. Taping, filling and sanding is not required at base layer of double layer applications.
- E. Where Level 5 finish is indicated, spray apply high build drywall surfacer over entire surface after joints have been properly treated; achieve a flat and tool mark-free finish.
- F. Fill and finish joints and corners of cementitious backing board as recommended by manufacturer.

3.08 TOLERANCES

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

END OF SECTION 092116

This page intentionally left blank

**SECTION 092216
NON-STRUCTURAL METAL FRAMING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Metal partition, ceiling, and soffit framing.
- B. Framing accessories.

1.02 REFERENCE STANDARDS

- A. AISI S100-12 - North American Specification for the Design of Cold-Formed Steel Structural Members; American Iron and Steel Institute; 2012.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process; 2020.
- C. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members; 2014.
- D. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products; 2015.
- E. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs; 2014.
- F. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data describing framing member materials and finish, product criteria, load charts, and limitations.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Company specializing in performing the work of this section with minimum five years documented experience and approved by manufacturer.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Metal Framing, Connectors, and Accessories:
 - 1. CEMCO; ____: www.cemcosteel.com/#sle.
 - 2. ClarkDietrich Building Systems; ____: www.clarkdietrich.com/#sle.
 - 3. Jaimes Industries; ____: www.jaimesind.com/#sle.
 - 4. Marino; ____: www.marinoware.com/#sle.
 - 5. Simpson Strong Tie; ____: www.strongtie.com/#sle.
 - 6. Steel Construction Systems; ____: www.steelconsystems.com/#sle.
 - 7. Substitutions: See Section 016000 - Product Requirements.

2.02 FRAMING MATERIALS

- A. Fire Rated Assemblies: Comply with applicable code and as indicated on drawings.
- B. Non-Loadbearing Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/240 at 5 psf.
 - 1. Studs: C shaped with flat or formed webs with knurled faces.
 - 2. Runners: U shaped, sized to match studs.
 - 3. Ceiling Channels: C shaped.
 - 4. Furring: Hat-shaped sections, minimum depth of 7/8 inch.

- 5. Resilient Furring Channels: Single or double leg configuration; 1/2 inch channel depth.
- C. Loadbearing Studs: As specified in Section 054000.
- D. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
 - 1. Sound Isolation Clips: Molded rubber isolator and steel clip, fastens directly to framing or structure to provide acoustical separation in gypsum board walls and ceilings.
- E. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
 - 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100-12.
 - 2. Material: ASTM A653/A653M steel sheet, SS Grade 50, with G60/Z180 hot dipped galvanized coating.
 - 3. Provide components UL-listed for use in UL-listed fire-rated head of partition joint systems indicated on drawings.
- F. Deflection and Firestop Track: Intumescent strip factory-applied to track flanges expands when exposed to heat or flames to provide a perimeter joint seal.
- G. Sheet Metal Backing: 0.036 inch thick, galvanized.
- H. Anchorage Devices: Powder actuated.
- I. Non-Loadbearing Framing Accessories:
- J. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced.
 - 1. Ceiling Hangers: Type and size as specified in ASTM C754 for spacing required.
 - 2. Sound Isolation Clips: Molded rubber isolator and steel clip, fastens directly to framing or structure to provide acoustical separation in gypsum board walls and ceilings.
- K. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
- L. Touch-Up Primer for Galvanized Surfaces: SSPC-Paint 20 Type I - Inorganic.
- M. Sound Isolation Tape: Elastomeric foam tape for sound decoupling.
 - 1. Surface Burning Characteristics: Provide assemblies with flame spread index of 75 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
 - 2. Tape Thickness: 1/4 inch.
- N. Tracks and Runners: Same material and thickness as studs, bent leg retainer notched to receive studs with provision for crimp locking to stud.
- O. Furring and Bracing Members: Of same material as studs; thickness to suit purpose; complying with applicable requirements of ASTM C754.
- P. Fasteners: ASTM C1002 self-piercing tapping screws.

PART 3 EXECUTION

3.01 INSTALLATION OF STUD FRAMING

- A. Comply with requirements of ASTM C754.
- B. Extend partition framing to structure where indicated and to ceiling in other locations.
- C. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.
- D. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- E. Align and secure top and bottom runners at 24 inches on center.

- F. At partitions indicated with an acoustic rating:
 - 1. Place one bead of acoustic sealant between runners and substrate , studs and adjacent construction.
 - 2. Sound Isolation Tape: Apply to vertical studs and top and bottom tracks/runners in accordance with manufacturer's instructions.
- G. Fit runners under and above openings; secure intermediate studs to same spacing as wall studs.
- H. Install studs vertically at spacing indicated on drawings.
- I. Align stud web openings horizontally.
- J. Stud splicing is not permissible.
- K. Fabricate corners using a minimum of three studs.
- L. Double stud at wall openings, door and window jambs, not more than 2 inches from each side of openings.
- M. Brace stud framing system rigid.
- N. Coordinate erection of studs with requirements of door frames; install supports and attachments.
- O. Coordinate installation of bucks, anchors, and blocking with electrical, mechanical, and other work to be placed within or behind stud framing.
- P. Blocking: Use wood blocking secured to studs. Provide blocking for support of plumbing fixtures, toilet partitions, wall cabinets, toilet accessories, hardware, and opening frames.
- Q. Sound Isolation Clips: Mechanically attach to framing or structure with fasteners recommended by clip manufacturer. Install at spacing indicated on drawings.
- R. Furring: Coordinate with sound isolation clip spacing and locations. Lap splices a minimum of 6 inches.

3.02 CEILING AND SOFFIT FRAMING

- A. Comply with requirements of ASTM C754.
- B. Install furring after work above ceiling or soffit is complete. Coordinate the location of hangers with other work.
- C. Install furring independent of walls, columns, and above-ceiling work.
- D. Securely anchor hangers to structural members or embed in structural slab. Space hangers as required to limit deflection to criteria indicated. Use rigid hangers at exterior soffits.
- E. Space main carrying channels at maximum 72 inch on center, and not more than 6 inches from wall surfaces. Lap splice securely.
- F. Securely fix carrying channels to hangers to prevent turning or twisting and to transmit full load to hangers.
- G. Place furring channels perpendicular to carrying channels, not more than 2 inches from perimeter walls, and rigidly secure. Lap splices securely.
- H. Reinforce openings in suspension system that interrupt main carrying channels or furring channels with lateral channel bracing. Extend bracing minimum 24 inches past each opening.
- I. Laterally brace suspension system.

3.03 TOLERANCES

- A. Maximum Variation From True Position: 1/8 inch in 10 feet.
- B. Maximum Variation From Plumb: 1/8 inch in 10 feet.

END OF SECTION 092216

This page intentionally left blank

**SECTION 093000
TILING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Ceramic trim.
- D. Non-ceramic trim.

1.02 RELATED REQUIREMENTS

- A. Section 071400 - Fluid-Applied Waterproofing.
- B. Section 079200 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
- C. Section 092116 - Gypsum Board Assemblies: Tile backer board.

1.03 REFERENCE STANDARDS

- A. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar; 2014.
- B. ANSI A108.1b - Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set, Modified Dry-Set, or Improved Modified Dry-Set Cement Mortar; 2023.
- C. ANSI A108.1c - Contractor's Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set, Modified Dry-Set, or Improved Modified Dry-Set Cement Mortar; 2023.
- D. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesive or Water Cleanable Tile-Setting Epoxy Adhesive; 2023.
- E. ANSI A108.5 - Setting of Ceramic Tile with Dry-Set Cement Mortar, Modified Dry-Set Cement Mortar, EGP (Exterior Glue Plywood) Modified Dry-Set Cement Mortar, or Improved Modified Dry-Set Cement Mortar; 2023.
- F. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grout Epoxy; 2023.
- G. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout; 1999 (Reaffirmed 2024).
- H. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout; 2023.
- I. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework; 2017 (Reaffirmed 2022).
- J. ANSI A108/A118/A136.1 - American National Standard Specifications for the Installation of Ceramic Tile (Compendium).; 2017.
- K. ANSI A108.12 - Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Modified Dry-Set Mortar; 2023.
- L. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone; 2005 (Reaffirmed 2010).
- M. ANSI A118.3 - American National Standard Specifications for Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy and Water Cleanable Tile-Setting Epoxy Adhesive; 2013 (Revised).

- N. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar; 2012 (Revised).
- O. ANSI A118.6 - American National Standard Specifications for Standard Cement Grouts for Tile Installation; 2010 (Revised).
- P. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation; 2010 (Revised).
- Q. ANSI A118.10 - American National Standard Specifications for Load Bearing, Bonded, Waterproof Membranes For Thin-Set Ceramic Tile And Dimension Stone Installation; 2014.
- R. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-set Ceramic Tile and Dimension Stone Installation; 2014.
- S. ANSI A137.1 - American National Standard Specifications for Ceramic Tile; 2022.
- T. ASTM C373 - Standard Test Method for Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products, Ceramic Tiles, and Glass Tiles; 2014a.
- U. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- V. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.
- W. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation; 2015.

1.04 ADMINISTRATIVE REQUIREMENTS

- A. Preinstallation Meeting: Convene a preinstallation meeting one week before starting work of this section; require attendance by all affected installers.

1.05 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Tile: 5 percent of each size, color, and surface finish combination.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of documented experience.
- B. Installer Qualifications: Company specializing in performing tile installation, with minimum of five years of documented experience.

1.07 MOCK-UP

- A. See Section 014000 - Quality Requirements, for general requirements for mock-up.
- B. Construct tile mock-up where indicated on drawings, incorporating all components specified for the location.
 - 1. Approved mock-up may remain as part of the Work.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.09 FIELD CONDITIONS

- A. Maintain ambient and substrate temperature of 50 degrees F during installation of mortar materials.

PART 2 PRODUCTS

2.01 TILE

- A. Porcelain Tile, Type CT-1 and CT-2: ANSI A137.1, standard grade.
 - 1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
 - 2. Size: as indicated on drawings.
 - 3. Thickness: 3/8 inch.
 - 4. Edges: Square.
 - 5. Color(s): As indicated on drawings.
 - 6. Pattern: As indicated on drawings.
 - 7. Products:
 - a. As scheduled.
- B. Glazed Wall Tile, Type CT-4: ANSI A137.1, standard grade.
 - 1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
 - 2. Size: as indicated on drawings.
 - 3. Thickness: 3/8 inch.
 - 4. Edges: Cushioned.
 - 5. Surface Finish: Glazed.
 - 6. Color(s): As indicated on drawings.
 - 7. Pattern: As indicated on drawings.
 - 8. Products:
 - a. As scheduled.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.02 TRIM AND ACCESSORIES

- A. Ceramic Trim: Matching cove base ceramic shapes in sizes indicated.
 - 1. Applications:
 - a. Floor to Wall Joints: Cove base.
 - 2. Manufacturers: Same as for tile.
- B. Non-Ceramic Trim: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
 - 1. Applications:
 - a. Wall corners, outside.
 - b. Transition between floor finishes of different heights.
 - c. Thresholds at door openings.
 - 2. Manufacturers:
 - a. Schluter-Systems: www.schluter.com.
 - b. Substitutions: See Section 016000 - Product Requirements.

2.03 SETTING MATERIALS

- A. Manufacturers: provide setting materials by same manufacturer as grout.
- B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
 - 1. Products:
 - a. ARDEX Engineered Cements; ARDEX N 23 MICROTEC: www.ardexamericas.com/#sle.
 - b. Merkrete, by Parex USA, Inc; Merkrete 735 Premium Flex: www.merkrete.com/#sle.
 - c. TEC, an H.B. Fuller Construction Products Brand; TEC Ultimate Large Tile Mortar: www.tecspecialty.com/#sle.

2.04 GROUTS

- A. Manufacturers:
 - 1. Custom Building Products; _____: www.custombuildingproducts.com/#sle.
 - 2. LATICRETE International, Inc; LATICRETE PERMACOLOR Grout: www.laticrete.com/#sle.
 - 3. Mapei; www.mapei.com/us.
 - 4. Substitutions: See Section 016000 - Product Requirements.
- B. Commercial Grade Grout:
 - 1. Applications: use at floor and wall tile locations.
 - 2. Floor grout joints to be 1/8" wide.

2.05 THIN-SET ACCESSORY MATERIALS

- A. Concrete floor crack isolation membrane: material complying with ANSI A118.12; not intended as water proofing.
 - 1. Thickness: 20 mils, maximum.
 - 2. Crack resistance: no failure at 1/16 inch gap, minimum.
- B. Epoxy Grout: ANSI A118.3 chemical resistant and water-cleanable epoxy grout.
 - 1. Color(s): As indicated on drawings.
 - 2. Products:
 - a. LATICRETE International, Inc; LATICRETE SPECTRALOCK PRO Premium Grout: www.laticrete.com/#sle.
- C. Stain Resistant Grout Additive: Liquid admixture for sanded and unsanded cement-based grouts; mix with dry grout material in place of water.
 - 1. Applications: Where indicated.

2.06 MAINTENANCE MATERIALS

- A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
 - 1. Applications: Between tile and plumbing fixtures.
 - 2. Color(s): As selected by Architect from manufacturer's full line..
- B. Grout Sealer: Liquid-applied, moisture and stain protection for existing or new Portland cement grout.
 - 1. Composition: Water-based colorless silicone.
- C. Tile Sealer: Stain protection for encaustic cement tile.
 - 1. Products:
 - a. Miracle Sealants 511 Porous Plus..

2.07 ACCESSORY MATERIALS

- A. Waterproofing Membrane at Floors: Specifically designed for bonding to cementitious substrate under thick mortar bed or thin-set tile; complying with ANSI A118.10.
 - 1. Crack Resistance: No failure at 1/16 inch gap, minimum; comply with ANSI A118.12.
 - 2. Fluid or Trowel Applied Type:
 - a. Material: Synthetic rubber.
 - b. Thickness: 25 mils, minimum, dry film thickness.
 - c. Products:
 - 1) Custom Building Products; RedGard Crack Prevention and Waterproofing Membrane: www.custombuildingproducts.com/#sle.
 - 2) LATICRETE International, Inc; LATICRETE HYDRO BAN: www.laticrete.com/#sle.
 - 3) Substitutions: See Section 016000 - Product Requirements.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of setting materials to sub-floor surfaces.
- D. Verify that concrete sub-floor surfaces are ready for tile installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by tile manufacturer and setting materials manufacturer.
- E. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.
- D. Prepare substrate surfaces for adhesive installation in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - GENERAL

- A. Install tile and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.13, manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles mitered.
- F. Install non-ceramic trim in accordance with manufacturer's instructions.
- G. Sound tile after setting. Replace hollow sounding units.
- H. Keep control and expansion joints free of mortar, grout, and adhesive.
- I. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- J. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- K. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

3.04 INSTALLATION - FLOORS - THIN-SET METHODS

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.

3.05 INSTALLATION - WALL TILE

- A. Over interior concrete and masonry install in accordance with TCNA (HB) Method W202, thin-set with dry-set or latex-Portland cement bond coat.

3.06 CLEANING

- A. Clean tile and grout surfaces.

3.07 PROTECTION

- A. Do not permit traffic over finished floor surface for 4 days after installation.

END OF SECTION 093000

**SECTION 095100
ACOUSTICAL CEILINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

1.02 REFERENCE STANDARDS

- A. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings; 2013a.
- B. ASTM C636/C636M - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels; 2013.
- C. ASTM E580/E580M - Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions; 2020.
- D. ASTM E1264 - Standard Classification for Acoustical Ceiling Products; 2014.
- E. UL (FRD) - Fire Resistance Directory; current edition.

1.03 ADMINISTRATIVE REQUIREMENTS

- A. Sequence work to ensure acoustical ceilings are not installed until dust generating activities have terminated, and overhead work is completed, tested, and approved.
- B. Do not install acoustical units until after interior wet work is dry.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.

1.05 QUALITY ASSURANCE

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years documented experience.

1.06 FIELD CONDITIONS

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acoustic Tiles/Panels:
 - 1. Armstrong World Industries, Inc: www.armstrong.com/#sle.
 - 2. CertainTeed Corporation; ____: www.certainteed.com/#sle.
 - 3. USG: www.usg.com/#sle.
- B. Suspension Systems:
 - 1. Same as for acoustical units.

2.02 ACOUSTICAL UNITS

- A. Armstrong World Industries, Inc: www.armstrong.com.
- B. Acoustical Units - General: ASTM E1264, Class A.
 - 1. See drawings for product selections.
 - 2. VOC Content: As specified in Section 016116.

2.03 SUSPENSION SYSTEM(S)

- A. Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with stabilizer bars, clips, splices, perimeter moldings, and hold down clips as required. See system descriptions above.
- B. See drawings for product selections.
- C. Exposed Steel Suspension System: Formed steel, commercial quality cold rolled; heavy-duty.
 - 1. Construction: Double web.
 - 2. Finish: as indicated on drawings..
- D. Exposed Aluminum Suspension System: Extruded aluminum; heavy-duty.
 - 1. Profile: Tee; 15/16 inch wide face.
 - 2. Products:

2.04 ACCESSORIES

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
- B. Perimeter Moldings: Armstrong Shadow Molding 7874.
 - 1. At Exposed Grid: Provide L-shaped molding for mounting at same elevation as face of grid.
 - 2. At Concealed Grid: Provide concealed molding.
- C. Acoustical Insulation: ASTM C665 friction fit type, unfaced batts.
 - 1. Thickness: 2 inch.
 - 2. Size: To fit acoustical suspension system.
- D. Acoustical Sealant For Perimeter Moldings: Non-hardening, non-skinning, for use in conjunction with suspended ceiling system.
- E. Gasket For Perimeter Moldings: Closed cell rubber sponge tape.
- F. Touch-up Paint: Type and color to match acoustical and grid units.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

3.02 INSTALLATION - SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C636/C636M, ASTM E580/E580M, and manufacturer's instructions and as supplemented in this section.
- B. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- C. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- D. Locate system on room axis according to reflected plan.
- E. Install after major above-ceiling work is complete. Coordinate the location of hangers with other work.
- F. Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- G. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- H. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- I. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.

- J. Do not eccentrically load system or induce rotation of runners.
- K. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.

3.03 INSTALLATION - ACOUSTICAL UNITS

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install units after above-ceiling work is complete.
- E. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- F. Cutting Acoustical Units:
 - 1. Make field cut edges of same profile as factory edges.
- G. Where round obstructions occur, provide preformed closures to match perimeter molding.
- H. Lay acoustical insulation for a distance of 48 inches either side of acoustical partitions as indicated.

3.04 TOLERANCES

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

END OF SECTION 095100

This page intentionally left blank

**SECTION 096466
WOOD ATHLETIC FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Wood athletic flooring.
- B. Subflooring.
- C. Sleepers.
- D. Resilient cushioning.
- E. Sheet vapor retarder.
- F. Floor finishes.
- G. Surface finishing.

1.02 RELATED REQUIREMENTS

- A. Section 033000 - Cast-in-Place Concrete: Concrete subfloor surface; recessed.

1.03 REFERENCE STANDARDS

- A. MFMA (PUR) - Performance and Uniformity Rating Sport Specific Standards; current edition.
- B. MFMA (SPEC) - Guide Specifications for Maple Flooring Systems; current edition.

1.04 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate floor joint pattern and termination details.
 - 1. Indicate provisions for expansion and contraction, wall base, and game insert or socket devices.
 - 2. Indicate size and type fasteners and anchors.
- C. Concrete Subfloor Test Report: Submit a copy of the moisture and alkalinity (pH) test reports.
- D. Installation Instructions: Indicate standard and special installation procedures.
- E. Maintenance Data: Include maintenance procedures and recommended maintenance materials.
- F. Manufacturer's Qualification Statement.
- G. Installer's Qualification Statement.

1.05 QUALITY ASSURANCE

- A. Perform work of this section in accordance with MFMA (SPEC).
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section.
 - 1. Minimum five years of documented experience.
- C. Installer Qualifications: Company specializing in installing products specified in this section.
 - 1. Minimum five years of documented experience.

1.06 MOCK-UP

- A. Construct mock-up of wood athletic flooring including subflooring, resilient cushioning, and wood flooring. Illustrate final finish and include example of painted game lines.
- B. Size of mock-up to be not less than 24 inch long by 24 inch wide.
- C. Mock-up may remain as part of the work.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials and store off the floor in a well-ventilated, weather-tight space.

1.08 FIELD CONDITIONS

- A. The wood flooring and its components specified herein shall not be delivered or installed until all wet trades and overhead work is completed. This includes all masonry, painting, plaster, tile, marble, and terrazzo, as well as all overhead mechanical trades. The building shall be fully enclosed and weather tight and all permanent windows and doorways shall be installed.
- B. The concrete substrate shall be determined fully cured by industry standards and materials shall not be stored at the installation location unless the in-slab relative humidity level for the concrete slab is 85% or lower before installation. The concrete slab shall be free of all foreign materials and broom cleaned by the General Contractor when turned over to the floor installer.
- C. Permanent HVAC units for the building shall have been operating a minimum of one week prior to the floor installation start up.
- D. During and after installation, the H.V.A.C. system should be complete, operational, and conditioning air to be within **55/75 degrees Fahrenheit (13-27 degrees Celsius) with relative humidity between 35/50 percent** or to conditions expected following installation and during occupancy.
- E. Flooring must be stored on site in a dry, well-ventilated area while acclimating to site conditions. Moisture content of wood shall be consistent with the ambient conditions of the building as it will be maintained when occupied.

1.09 WARRANTY

- A. Provide manufacturer's standard 1-year warranty.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Wood Athletic Flooring:
 - 1. Action Floor Systems; Action Anchor Flex: www.actionfloors.com/#sle.
 - 2. Connor Sports Flooring; _____: www.connorfloor.com/#sle.
 - 3. Robbins Sports Surfaces; _____: www.robbsinfloor.com/#sle.
 - 4. Basis of design: AACER Wood Floors, Crandon WI..
 - 5. Substitutions: Section 016000 - Product Requirements.

2.02 WOOD ATHLETIC FLOORING

- A. General: Wood strip flooring, MFMA (PUR) compliant for application indicated; system components provided by single manufacturer.
- B. System Description:
 - 1. Fixed, cushioned sleeper system, wood strip flooring.

2.03 COMPONENTS

- A. Wood Strip Flooring:
 - 1. Provide MFMA grade-marked flooring, stamped as manufactured by MFMA member mill.
 - 2. Species: Northern hard maple, kiln dried; tongue and groove edges, end matched.
 - 3. Grade: Second and better.
 - 4. Thickness: 25/32 inch.
 - 5. Width: 2-1/4 inches.
 - 6. Provide 1/64" expansion bead.
- B. Sleepers:
 - 1. Aacer engineered Power Sleepers with pre-drilled anchor pockets and pads attached.
- C. Subflooring: One layer of 15/32 inch thick plywood, APA rated, exposure 1, minimum span rating of 48/24.
- D. Resilient Underlayment: EPDM, black 50 durometer pad.
 - 1. Thickness: 1/2 inch
- E. Vapor Retarder: Polyethylene sheet, 6 mil thick; 2 inch wide tape for sealing sheet seams.

2.04 FINISHES

- A. Floor Finishes: Types recommended by flooring manufacturer and complying with MFMA specifications.
 - 1. Sealer: Oil based urethane.
 - 2. Finish Coats: Oil based urethane; high gloss.
 - 3. Game Marking Paint: Compatible with sealer and finish coats; colors as indicated on drawings.

2.05 ACCESSORIES

- A. Ventilating Base: Molded rubber, ____ inch high with a ____ inch toe, pre-molded outside corners; black color.
- B. Game Socket Devices: Cast aluminum type, with anchors.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting this work.
- B. Verify that concrete subfloor surface is smooth and flat to plus or minus 1/4 inch in 10 feet.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
 - 1. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

3.02 PREPARATION

- A. Prepare substrate to receive wood flooring in accordance with manufacturer's and MFMA instructions.
- B. Vacuum clean substrate.

3.03 INSTALLATION

- A. Place vapor retarder over concrete surface, overlap seams a minimum of 6 inches and seal with tape.
- B. Resilient Underlayment: Install in accordance with manufacturer's instructions.
- C. Sleepers with Plywood Subfloor:
 - 1. Place sleepers at 90 degree angle to direction of finished floor; space 12 inches on center. Stagger end joints a minimum of 24 inches.
 - 2. Fasten plywood subfloor over sleepers at 45 degree angle to direction of finished floor. Allow minimum 1/4 inch between plywood subfloor edges.
- D. Wood Flooring:
 - 1. Install in accordance with manufacturer's and MFMA instructions.
 - 2. Lay flooring parallel to length of main playing area. Blind nail or staple to subfloor.
 - 3. Install edge strips at unprotected or exposed edges, and where flooring terminates.
 - 4. Provide 2 inch expansion space at walls and other interruptions.
- E. Install base at floor perimeter to cover expansion space in accordance with manufacturer's instructions. Miter inside corners.
- F. Install floor sockets and inserts to a depth sufficient to ensure flush top surface with floor surface.
- G. Finishing:
 - 1. Mask off adjacent surfaces before beginning sanding.
 - 2. Sand flooring to smooth even finish with no evidence of sander marks. Remove dust by vacuum.

3. Apply finishes in accordance with floor finish manufacturer's and MFMA instructions.
4. Apply first coat, allow to dry, then buff lightly with recommended pad to remove irregularities. Vacuum clean and wipe with damp, lint-free cloth before applying succeeding coats.
5. Apply game lines/markers in accordance with layout indicated on drawings.
6. Apply last coat of finish.

3.04 CLEANING

- A. Clean floor surfaces in accordance with floor finish manufacturer's instructions.

3.05 PROTECTION

- A. Prohibit traffic on finished floor for 72 hours after installation.
- B. Place protective coverings over finished floors; do not remove coverings until Date of Substantial Completion.

END OF SECTION 096466

**SECTION 096500
RESILIENT FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

1.02 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- B. ASTM F1344 - Standard Specification for Rubber Floor Tile; 2015.
- C. ASTM F1700 - Standard Specification for Solid Vinyl Tile; 2013a.
- D. ASTM F1861 - Standard Specification for Resilient Wall Base; 2008 (Reapproved 2012).
- E. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source; 2015.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Shop Drawings: Indicate seaming plans and floor patterns.
- D. Verification Samples: Submit two samples, 4 by 4 inch in size illustrating color and pattern for each resilient flooring product specified.
- E. Certification: Prior to installation of flooring, submit written certification by flooring manufacturer and adhesive manufacturer that condition of sub-floor is acceptable.
- F. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning, stripping, and re-waxing.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum 5 years documented experience.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.
- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Maintain temperature in storage area between 55 degrees F and 90 degrees F.
- D. Protect roll materials from damage by storing on end.
- E. Do not double stack pallets.

1.06 FIELD CONDITIONS

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

PART 2 PRODUCTS

2.01 SHEET FLOORING

2.02 TILE FLOORING

- A. Vinyl Tile - Type ____: Printed film type, with transparent or translucent wear layer.
 - 1. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
 - 2. Wear Layer Thickness: 0.040 inch.
 - 3. Total Thickness: 0.125 inch.
 - 4. Pattern: As indicated on drawings..
 - 5. Color: As indicated on drawings.

2.03 RESILIENT BASE

- A. Resilient Base: ASTM F1861, Type TP, rubber, thermoplastic; top set Style B, Cove.
 - 1. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
 - 2. Thickness: 0.125 inch.
 - 3. Length: Roll.
 - 4. Color and size: As indicated on drawings.
 - 5. Accessories: Premolded external corners and internal corners.

2.04 ACCESSORIES

- A. Primers, Adhesives, and Seam Sealer: Waterproof; types recommended by flooring manufacturer.
 - 1. VOC Content Limits: As specified in Section 016116.
- B. Filler for Coved Base: Plastic.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for resilient flooring installation by testing for moisture and pH.
 - 1. Test in accordance with ASTM F710.
 - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Apply primer as required to prevent "bleed-through" or interference with adhesion by substances that cannot be removed.

3.03 INSTALLATION - GENERAL

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
 - 1. Fit joints and butt seams tightly.
 - 2. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
- E. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.
- F. Spread only enough adhesive to permit installation of materials before initial set.

- G. Fit joints and butt seams tightly.
- H. Set flooring in place, press with heavy roller to attain full adhesion.
- I. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
 - 1. Resilient Strips: Attach to substrate using adhesive.
- J. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

3.04 INSTALLATION - SHEET FLOORING

- A. Lay flooring with joints and seams parallel to longer room dimensions, to produce minimum number of seams. Lay out seams to avoid widths less than 1/3 of roll width; match patterns at seams.
- B. Cut sheet at seams in accordance with manufacturer's instructions.
- C. Coved Base: Install as detailed on drawings, using coved base filler as backing at floor to wall junction. Extend sheet flooring vertically to height indicated, and cover top edge with metal cap strip.

3.05 INSTALLATION - TILE FLOORING

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.

3.06 INSTALLATION - RESILIENT BASE

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Miter internal corners. At external corners, use premolded units. At exposed ends, use premolded units.
- C. Install base on solid backing. Bond tightly to wall and floor surfaces.
- D. Scribe and fit to door frames and other interruptions.

3.07 CLEANING

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

3.08 PROTECTION

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

END OF SECTION 096500

This page intentionally left blank

**SECTION 096700
FLUID-APPLIED FLOORING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Fluid-applied flooring and base.
- B. Divider strips and accessories.

1.02 REFERENCE STANDARDS

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring; 2011.
- B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride; 2011.
- C. ICRI 310.2R - Selecting and Specifying Concrete Surface Preparation; 2013.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns and colors available.
- C. Samples: Submit two samples, 4 by 4 inch in size illustrating color and pattern for each floor material for each color specified.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years documented experience.
- B. Applicator Qualifications: Company specializing in performing the work of this section.
 - 1. Approved by manufacturer.
- C. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.
 - 1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
 - 2. Contractor shall have completed at least 10 projects of similar size and complexity.
- D. Source Limitations: Obtain primary resinous flooring materials, including primers, resins, hardening agents, grouting coats, and topcoats, through one source from a single manufacturer, with not less than ten years of successful experience in manufacturing and installing principal materials described in this section. Provide secondary materials, including patching and fill material, joint sealant, and repair materials, of type and from source recommended by manufacturer of primary materials.
- E. Manufacturer Field Technical Service Representatives: Resinous flooring manufacture shall retain the services of Field Technical Service Representatives who are trained specifically on installing the system to be used on the project.
 - 1. Field Technical Services Representatives shall be employed by the system manufacture to assist in the quality assurance and quality control process of the installation and shall be available to perform field problem solving issues with the installer.

1.05 MOCK UP

- A. Construct mock-up(s) of fluid applied flooring to serve as basis for evaluation of texture and workmanship.
 - 1. Number of Mock-Ups to be Prepared: One.
 - 2. Use same materials and methods for use in the work.
 - 3. Locate where directed.

4. Minimum Size: 48 inches.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Store resin materials in a dry, secure area.
- B. Store materials for three days prior to installation in area of installation to achieve temperature stability.

1.07 FIELD CONDITIONS

- A. Maintain minimum temperature in storage area of 65 degrees F.
- B. Maintain ambient temperature required by manufacturer 72 hours prior to, during, and 24 hours after installation of materials.

1.08 WARRANTY

- A. A. Manufacturer shall furnish a single, written warranty covering both material and workmanship for a period of (1) full years from date of installation, or provide a joint and several warranty signed on a single document by material manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of (1) full year from date of installation. A sample warranty letter must be included with bid package or bid may be disqualified.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Fluid-Applied Flooring:
 1. Plexi-Chemie.

2.02 PRODUCTS

- A. PlexiQuartz
 1. Color and Pattern: Architect to select from manufacturers standard colors and patterns.
 2. Wearing surface: Light texture
 3. Cove Base: Provide integral cove base.
 4. Overall system thickness: nominal 1/8"

2.03 ACCESSORY MATERIALS

- A. Primer: Type recommended by manufacturer for substrate and body coats indicated. Formulation Description: (1) coat PlexiRez MMA primer 100 and (1) coat PlexiRez MMA primer Topcoat 500.
- B. Patching and Fill Material: Resinous product of or approved by resinous flooring manufacturer and recommended by manufacturer for application indicated.
- C. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service and joint condition indicated. Allowances should be included for Stonflex MP7 joint fill material.

2.04 MATERIALS

1.01

- A. Fluid-Applied Flooring Type EP-1: Polyurethane solids water clear epoxy coating base coat(s) with embedded quartz aggregate.
 1. Thickness: 1/8 inch, nominal, when dry.
 2. Texture: Slip resistant.
 3. Sheen: High gloss.
 4. Color: As selected by Architect.

1.02 ACCESSORIES

- A. Divider Strips: Zinc, ____ inch thick, height to match flooring thickness, with anchoring features; color as selected.

- B. Base Caps, and Separator Strips: Match divider strips, with projecting base of 1/8 inch.

PART 3 EXECUTION

2.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive flooring.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive flooring.
- C. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of materials to sub-floor surfaces.
- D. Verify that concrete sub-floor surfaces are ready for flooring installation by testing for moisture emission rate and alkalinity; obtain instructions if test results are not within limits recommended by flooring materials manufacturer.

2.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Prepare concrete surfaces according to ICRI 310.2R, _____.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Grind irregularities above the surface level. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.
- E. Apply primer to surfaces required by flooring manufacturer.

2.03 INSTALLATION - FLOORING

- A. Apply in accordance with manufacturer's instructions.
- B. Apply each coat to minimum thickness indicated.
- C. Finish to smooth level surface.
- D. Cove at vertical surfaces.

2.04 PROTECTION

- A. Prohibit traffic on floor finish for 48 hours after installation.

END OF SECTION 096700

This page intentionally left blank

**SECTION 096813
TILE CARPETING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Carpet tile, fully adhered fully adhered.

1.02 REFERENCE STANDARDS

- A. ASTM D2859 - Standard Test Method for Ignition Characteristics of Finished Textile Floor Covering Materials; 2006 (Reapproved 2011).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source; 2014c.
- C. CRI 104 - Standard for Installation of Commercial Carpet; 2015.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- D. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Carpet Tiles: Quantity equal to 5 percent of total installed of each color and pattern installed.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years documented experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years documented experience and approved by carpet tile manufacturer.

1.05 FIELD CONDITIONS

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Tile Carpeting: Textured patterned loop, manufactured in one color dye lot.
 - 1. Basis of Design: Convene by Shaw Contract.
 - 2. Tile Size: 12" x 48", nominal.
 - 3. Pile Thickness: 0.092 inch.
 - 4. Color: as indicated on drawings.
 - 5. Pattern: as indicated on drawings.
 - 6. Critical Radiant Flux: Minimum of 0.45 watts/sq cm, when tested in accordance with ASTM E648 or NFPA 253.
 - 7. Surface Flammability Ignition: Pass ASTM D2859 (the "pill test").
 - 8. VOC Content: Comply with Section 016116.
 - 9. Gauge: 1/12 inch.
 - 10. Stitches: 8.5 per inch.
 - 11. Pile Weight: 20 oz/sq yd.
 - 12. Primary Backing Material: 100% Synthetic.
 - 13. Fiber System: Type 6 Nylon.

2.02 ACCESSORIES

- A. Edge Strips: Rubber, color as selected by Architect.
- B. Adhesives:
 - 1. Compatible with materials being adhered; maximum VOC content as specified in Section 016116.
- C. Carpet Tile Adhesive: Recommended by carpet tile manufacturer.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that sub-floor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that sub-floor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to sub-floor surfaces.
- C. Cementitious Sub-floor Surfaces: Verify that substrates are dry enough and ready for flooring installation by testing for moisture and pH.
 - 1. Test in accordance with ASTM F710.
 - 2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.

3.02 PREPARATION

- A. Remove sub-floor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with sub-floor filler.
- B. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- C. Vacuum clean substrate.

3.03 INSTALLATION

- A. Starting installation constitutes acceptance of sub-floor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

3.04 CLEANING

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.
- B. Clean and vacuum carpet surfaces.

END OF SECTION 096813

SECTION 098414
ACOUSTIC STRETCHED-FABRIC WALL AND CEILING SYSTEMS

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Acoustic stretched-fabric wall system.
- B. Accessories as required for complete installation.

1.02 REFERENCE STANDARDS

- A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method; 2009a.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests; 2005 (Reapproved 2012).
- D. ASTM E2573 - Standard Practice for Specimen Preparation and Mounting of Site-Fabricated Stretch Systems to Assess Surface Burning Characteristics; 2019.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data sheets on each product to be used, including:
 - 1. Preparation instructions and recommendations.
 - 2. Storage and handling requirements and recommendations.
 - 3. Installation methods.
 - 4. Specimen warranty.
- C. Shop Drawings: Details indicating typical transitions to other finish surfaces.
- D. Selection Samples: Fabric swatches representing manufacturer's full range of available colors, textures, and patterns.
- E. Test Reports: Certified test data from an independent test agency verifying that wall systems meet specified requirements for acoustical and fire performance.
- F. Manufacturer's Qualification Statement.
- G. Maintenance Contract.
- H. Warranty Documentation: Submit manufacturer's warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.
- I. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Supply an additional 5 (five) percent of fabric installed for Owner's use in maintenance of project.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of documented experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience and approved by manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect fabric, acoustical backing, and track from excessive moisture in shipment, storage, and handling.
- B. Do not deliver materials to project until wet work such as concrete and plaster has been completed.

- C. Store products in manufacturer's unopened packaging until ready for installation.
- D. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.06 FIELD CONDITIONS

- A. Do not begin installation until interior conditions have reached temperature and humidity that will be maintained during occupancy.

1.07 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within one year period after Date of Substantial Completion.

PART 2 PRODUCTS

2.01 ACOUSTIC STRETCHED-FABRIC SYSTEM

- A. Acoustic Stretched-Fabric System: Field installed, fabric is stretched and set into framework and laid over acoustic material anchored to substrate. Framework consists of continuous perimeter and intermediate mounting frames anchored to substrate, and designed to permit removal and replacement of fabric within framed areas without affecting adjacent areas.
 - 1. Surface Burning Characteristics: Flame Spread Index of 25, maximum; Smoke Developed Index of 450, maximum; when whole system is tested in accordance with ASTM E84 using mounting specified in ASTM E2573 for stretched systems.
 - 2. Noise Reduction Coefficient (NRC): 0.80, minimum, when tested in accordance with ASTM C423, Type A mounting per ASTM E795.
 - 3. Install fabric over acoustic material and into framework without use of adhesives, tapes, or fasteners.
 - 4. Seams in fabric are not permitted; adjust frame layouts to accommodate width of fabric; obtain written approval of frame layouts from Architect.
- B. Provide materials and systems made of recycled content, at least 50 percent post-consumer or pre-consumer (post-industrial).
- C. Verify that adhesives and sealants used in installation of acoustic stretched-fabric system have acceptable low VOC emission ratings.

2.02 MATERIALS

- A. Frame: Extruded polymer framing system with serrated jaws of sufficient strength to hold fabric in place after repeated applications.
 - 1. Wall Frame Size: 1/2 inch height from wall substrate with minimum 1 inch wide base.
 - a. Wall Frame Shape: Square at perimeter, and square at intermediate abutting joints.
 - 2. Frame Color: As selected from manufacturer's standard colors.
- B. Acoustic Material:
 - 1. Provide type of acoustic material in thickness required to achieve Noise Reduction Coefficient (NRC) indicated.
 - 2. Ensure that thickness of acoustic material fills depth of frame as necessary for application without use of support blocking.
 - 3. Compressed Fiberglass Board, Type ____: Class A fire rated in accordance with ASTM E84.
 - a. Overall Thickness: 1 inch.
 - b. Panel Size: custom; as indicated on drawings.
- C. Fabric: Heavy-duty fire-retardant commercial fabric, as provided by manufacturer of acoustic stretched-fabric system; color, pattern, and texture as indicated on drawings.
- D. Fasteners: As recommended by manufacturer of acoustic stretched-fabric system in accordance with project requirements.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Install acoustic stretched-fabric system at locations indicated in accordance with approved shop drawings and manufacturer's instructions.
- B. Frames: Install perimeter and intermediate frames using appropriate fasteners for prepared substrate, firmly secured to ensure frames do not separate from substrate.
 - 1. For tile or masonry substrates, apply continuous bead of adhesive along base of framing in addition to spacing of conical anchors and/or fasteners at 6 to 8 inches on center.
 - 2. Follow contours of wall and scribe to adjoining work at borders, penetrations, and imperfections.
 - 3. Install framing around openings and penetrations.
 - 4. At outside corners, miter framing to allow installation of acoustic material and secure placement of fabric around corner without intermediate framework.
 - 5. Allow for spacing of framework to accommodate insertion of installation tool.
- C. Fabric: Stretch fabric over acoustic material, locking edges of fabric into frame's serrated jaws using manufacturer's recommended tool. Maintain fabric weave plumb, level and true, in proper relation to building lines, without ripples, waviness, hourglass, or other deleterious effects.
 - 1. Upon fabric installation, do not employ adhesives or mechanical fasteners of any type, and ensure fabric is free-floating and in contact with acoustic material as necessary.
 - 2. Stapling or gluing of fabric to cores or channel framework is not permitted.
 - 3. Provide tension in fabric sufficient to prevent sagging under anticipated changes in temperature and humidity.
 - 4. At outside corners, wrap as single piece of fabric without joints or seams.

3.02 CLEANING

- A. Clean exposed surfaces of acoustic stretched-fabric system in compliance with manufacturers instructions for cleaning and repair of minor damage to exposed surfaces.

3.03 PROTECTION

- A. Protect installed materials upon completion of this work, using methods that will ensure that the finished work is without damage or deterioration upon Date of Substantial Completion.

3.04 MAINTENANCE

- A. Provide a separate maintenance contract for specified maintenance service.

END OF SECTION 098414

This page intentionally left blank

**SECTION 099113
EXTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish exterior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated, including the following:
 - 1. Exposed surfaces of steel lintels and ledge angles.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, zinc, and lead.
 - 6. Floors, unless specifically indicated.
 - 7. Brick, glass unit masonry, architectural concrete, cast stone, integrally colored plaster and stucco.
 - 8. Glass.
 - 9. Concealed pipes, ducts, and conduits.

1.02 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.

1.03 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum 10 years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 10 years experience and approved by manufacturer.

1.04 MOCK-UP

- A. See Section 014000 - Quality Requirements, for general requirements for mock-up.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.06 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Do not apply exterior paint and finishes during rain or snow, or when relative humidity is outside the humidity ranges required by the paint product manufacturer.
- D. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes used in any individual system from the same manufacturer; no exceptions.
- B. Paints:
 - 1. Pittsburgh Paints: www.ppgpaints.com/#sle.
 - 2. Sherwin-Williams Company: www.sherwin-williams.com/#sle.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless required to be a field-catalyzed paint.
 - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
 - 2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 3. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 4. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 5. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content: Comply with Section 016116.
- C. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- D. Colors: To be selected from manufacturer's full range of available colors.
 - 1. Selection to be made by Architect after award of contract.

2.03 PAINT SYSTEMS - EXTERIOR

- A. Paint E-OP - Exterior Surfaces to be Painted, where indicated: concrete, concrete masonry units, and primed metal.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): Exterior Alkyd Enamel.
 - a. Products:
 - 1) Sherwin Williams Industrial Enamel, B54-100 Series. - Primed Metal.
 - 2) Sherwin Williams Loxon XP - Concrete, Concrete Masonry.
- B. Paint E-TR-C - Transparent Finish on Concrete Floors:
 - 1. 1 coat stain.
 - 2. Sealer: Water Based Sealer for Concrete Floors.
 - a. Products:
 - 1) W.R. Meadows, VOCOMP - 25, water-based acrylic concrete curing and sealing compound.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.
 - 1. Interior/Exterior Latex Block Filler.
 - a. Products:
 - 1) Sherwin Williams Loxon C&M Primer/Sealer.
 - 2) Sherwin Williams Loxon Block Surfacers
 - 2. Anti-Corrosive Alkyd Primer for Metal.
 - a. Products:
 - 1) Pittsburgh Paints Speedhide Interior/Exterior Rust Inhibitive Steel Primer, 6-212 Series. (MPI #79)
 - 2) Sherwin Williams Kem Kromik Universal Metal Primer, B50AZ0006 - Gray..

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.
- D. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 - 1. Exterior Plaster and Stucco: 12 percent.
 - 2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 - 3. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces for finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.
- E. Remove mildew from impervious surfaces by scrubbing with solution of tetra-sodium phosphate and bleach. Rinse with clean water and allow surface to dry.
- F. Concrete:
 - 1. Remove release agents, curing compounds, efflorescence, and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces to be coated exceeds that permitted in manufacturer's written instructions.
 - 2. Clean surfaces with pressurized water. Use pressure range of 1,500 to 4,000 psi at 6 to 12 inches. Allow to dry.
 - 3. Clean concrete according to ASTM D4258. Allow to dry.
- G. Masonry:
 - 1. Remove efflorescence and chalk. Do not coat surfaces if moisture content or alkalinity of surfaces or if alkalinity of mortar joints exceed that permitted in manufacturer's written instructions. Allow to dry.

2. Prepare surface as recommended by top coat manufacturer.
 3. Clean surfaces with pressurized water. Use pressure range of 600 to 1,500 psi at 6 to 12 inches. Allow to dry.
- H. Exterior Plaster: Fill hairline cracks, small holes, and imperfections with exterior patching plaster. Make smooth and flush with adjacent surfaces. Wash and neutralize high alkali surfaces.
- I. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- J. Galvanized Surfaces:
1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 2. Prepare surface according to SSPC-SP 2.
- K. Ferrous Metal:
1. Solvent clean according to SSPC-SP 1.
 2. Shop-Primed Surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Re-prime entire shop-primed item.
 3. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning". Protect from corrosion until coated.
- L. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance.
- D. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply additional coats until complete hide is achieved.
- E. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- F. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 099113

**SECTION 099123
INTERIOR PAINTING**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Surface preparation.
- B. Field application of paints.
- C. Scope: Finish interior surfaces exposed to view, unless fully factory-finished and unless otherwise indicated.
 - 1. Both sides and edges of plywood backboards for electrical and telecom equipment before installing equipment.
- D. Do Not Paint or Finish the Following Items:
 - 1. Items factory-finished unless otherwise indicated; materials and products having factory-applied primers are not considered factory finished.
 - 2. Items indicated to receive other finishes.
 - 3. Items indicated to remain unfinished.
 - 4. Fire rating labels, equipment serial number and capacity labels, bar code labels, and operating parts of equipment.
 - 5. Stainless steel, anodized aluminum, bronze, terne coated stainless steel, and lead items.
 - 6. Marble, granite, slate, and other natural stones.
 - 7. Floors, unless specifically indicated.
 - 8. Ceramic and other tiles.
 - 9. Brick, architectural concrete, cast stone, integrally colored plaster and stucco.
 - 10. Glass.
 - 11. Acoustical materials, unless specifically indicated.
 - 12. Concealed pipes, ducts, and conduits.

1.02 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM D16 - Standard Terminology for Paint, Related Coatings, Materials, and Applications; 2014.
- C. ASTM D4442 - Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Base Materials; 2007.
- D. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.
- E. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- F. SSPC-SP 1 - Solvent Cleaning; 2015.
- G. SSPC-SP 2 - Hand Tool Cleaning; 1982 (Ed. 2004).

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide complete list of products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified paint system(s) product is to be used in; include description of each system.
 - 4. Manufacturer's installation instructions.

- C. Samples: Submit three paper "draw down" samples, 8-1/2 by 11 inches in size, illustrating range of colors available for each finishing product specified.
 - 1. Where sheen is specified, submit samples in only that sheen.
 - 2. Allow 30 days for approval process, after receipt of complete samples by Architect.
- D. Certification: By manufacturer that paints and finishes comply with VOC limits specified.
- E. Maintenance Data: Submit data including finish schedule showing where each product/color/finish was used, product technical data sheets, material safety data sheets (MSDS), care and cleaning instructions, touch-up procedures, repair of painted and finished surfaces, and color samples of each color and finish used.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. See Section 016000 - Product Requirements, for additional provisions.
 - 2. Extra Paint and Finish Materials: 1 gallon of each color; from the same product run, store where directed.
 - 3. Label each container with color in addition to the manufacturer's label.

1.04 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified, with minimum 10 years documented experience.
- B. Applicator Qualifications: Company specializing in performing the type of work specified with minimum 10 years of documented experience.

1.05 MOCK-UP

- A. See Section 014000 - Quality Requirements, for general requirements for mock-up.
- B. Provide panel, 4 feet long by 8 feet wide, illustrating paint color, texture, and finish.
- C. Provide door and frame assembly illustrating paint color, texture, and finish.
- D. Locate where directed by Architect.
- E. Mock-up may remain as part of the work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Paint Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide paints and finishes from the same manufacturer.
 - 1. In the event that a single manufacturer cannot provide specified products, minor exceptions will be permitted provided approval by Architect is obtained using the specified procedures for substitutions.
 - 2. Substitution of MPI-approved products by a different manufacturer is preferred over substitution of unapproved products by the same manufacturer.

- B. Paints:
 - 1. Pittsburgh Paints: www.ppgpaints.com/#sle.
 - 2. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- C. Stains:
 - 1. Sherwin-Williams Company: www.sherwin-williams.com/#sle.
- D. Primer Sealers: Same manufacturer as top coats.
- E. Substitutions: See Section 016000 - Product Requirements.

2.02 PAINTS AND FINISHES - GENERAL

- A. Paints and Finishes: Ready mixed, unless intended to be a field-catalyzed paint.
 - 1. Where MPI paint numbers are specified, provide products listed in Master Painters Institute Approved Product List, current edition available at www.paintinfo.com, for specified MPI categories, except as otherwise indicated.
 - 2. Provide paints and finishes of a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating, with good flow and brushing properties, and capable of drying or curing free of streaks or sags.
 - 3. Provide materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
 - 4. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color.
 - 5. Supply each paint material in quantity required to complete entire project's work from a single production run.
 - 6. Do not reduce, thin, or dilute paint or finishes or add materials unless such procedure is specifically described in manufacturer's product instructions.
- B. Volatile Organic Compound (VOC) Content:
 - 1. Provide paints and finishes that comply with the most stringent requirements specified in the following:
 - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
 - b. Architectural coatings VOC limits of Florida.
 - c. USGBC LEED Rating System; for interior wall and ceiling finish (all coats), anti-corrosive paints on interior ferrous metal, sanding sealers, other sealers, and floor coatings.
 - 2. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
- C. Flammability: Comply with applicable code for surface burning characteristics.
- D. Sheens: Provide the sheens specified; where sheen is not specified, sheen will be selected later by Architect from the manufacturer's full line.
- E. Colors: As indicated on drawings.

2.03 PAINT SYSTEMS - INTERIOR

- A. Paint I-OP - Interior Surfaces to be Painted, Unless Otherwise Indicated: Including gypsum board, concrete, concrete masonry units, and galvanized steel.
 - 1. Two top coats and one coat primer.
 - 2. Top Coat(s): High Performance Architectural Interior Latex; MPI #138, 139, 140, or 141.
 - a. Products:
 - 1) Sherwin-Williams Pre-Catalyzed Waterbased Epoxy, Eg-Shel. (MPI #139)
 - 3. Top Coat Sheen:
 - a. Flat: MPI gloss level 1; use this sheen for ceilings and other overhead surfaces.
 - b. Eggshell: MPI gloss level 3; use this sheen at walls.

4. Primer: As recommended by top coat manufacturer for specific substrate.
- B. Medium Duty Door/Trim: For surfaces subject to frequent contact by occupants, including:
 1. Medium duty applications include doors, door frames, railings, and handrails.
 2. Two top coats and one coat primer.
 3. Top Coat(s): Interior Light Industrial Coating, Water Based; MPI #151, 153 or 154.
 - a. Products:
 - 1) Sherwin-Williams Pro Industrial Acrylic Coating, Semi-Gloss. (MPI #153)
- C. Paint I-TR-C - Transparent Finish on Concrete Floors.
 1. W. R. Meadows VOCOMP-25, water-based acrylic concrete curing and sealing compound - 1 coat stain.
 2. Sealer: Water Based for Concrete Floors; MPI #99.
 3. Sealer Sheen:
 - a. Eggshell: MPI gloss level 3; use this sheen at all locations.
- D. Paint WI-OP-2L - Wood, Opaque, Latex, 2 Coat (Type P2.1) :
 1. One coat of latex primer sealer.
 2. Satin: One coat of latex enamel; Wolf Gordon.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by manufacturer of top coats.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of painted surfaces.
- B. Patching Material: Latex filler.
- C. Fastener Head Cover Material: Latex filler.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Do not begin application of paints and finishes until substrates have been properly prepared.
- B. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- C. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially effect proper application.
- D. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- E. Test shop-applied primer for compatibility with subsequent cover materials.
- F. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes unless moisture content of surfaces are below the following maximums:
 1. Gypsum Wallboard: 12 percent.
 2. Masonry, Concrete, and Concrete Masonry Units: 12 percent.
 3. Interior Wood: 15 percent, measured in accordance with ASTM D4442.
 4. Concrete Floors and Traffic Surfaces: 8 percent.

3.02 PREPARATION

- A. Clean surfaces thoroughly and correct defects prior to application.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.
- C. Remove or mask surface appurtenances, including electrical plates, hardware, light fixture trim, escutcheons, and fittings, prior to preparing surfaces or finishing.
- D. Seal surfaces that might cause bleed through or staining of topcoat.

- E. Masonry:
- F. Concrete Floors and Traffic Surfaces: Remove contamination, acid etch, and rinse floors with clear water. Verify required acid-alkali balance is achieved. Allow to dry.
- G. Gypsum Board: Fill minor defects with filler compound. Spot prime defects after repair.
- H. Galvanized Surfaces:
 - 1. Remove surface contamination and oils and wash with solvent according to SSPC-SP 1.
 - 2. Prepare surface according to SSPC-SP 2.
- I. Wood Surfaces to Receive Opaque Finish: Wipe off dust and grit prior to priming. Seal knots, pitch streaks, and sappy sections with sealer. Fill nail holes and cracks after primer has dried; sand between coats. Back prime concealed surfaces before installation.
- J. Wood Doors to be Field-Finished: Seal wood door top and bottom edge surfaces with clear sealer.
- K. Metal Doors to be Painted: Prime metal door top and bottom edge surfaces.

3.03 APPLICATION

- A. Apply products in accordance with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual".
- B. Do not apply finishes to surfaces that are not dry. Allow applied coats to dry before next coat is applied.
- C. Apply each coat to uniform appearance in thicknesses specified by manufacturer.
- D. Dark Colors and Deep Clear Colors: Regardless of number of coats specified, apply as many coats as necessary for complete hide.
- E. Sand wood and metal surfaces lightly between coats to achieve required finish.
- F. Vacuum clean surfaces of loose particles. Use tack cloth to remove dust and particles just prior to applying next coat.
- G. Reinstall electrical cover plates, hardware, light fixture trim, escutcheons, and fittings removed prior to finishing.

3.04 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.

3.05 PROTECTION

- A. Protect finishes until completion of project.
- B. Touch-up damaged finishes after Substantial Completion.

END OF SECTION 099123

This page intentionally left blank

**SECTION 099600
HIGH-PERFORMANCE COATINGS**

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. High performance coatings.
- B. Surface preparation.

1.02 REFERENCE STANDARDS

- A. 40 CFR 59, Subpart D - National Volatile Organic Compound Emission Standards for Architectural Coatings; U.S. Environmental Protection Agency; current edition.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2015a.
- C. MPI (APL) - Master Painters Institute Approved Products List; Master Painters and Decorators Association; current edition, www.paintinfo.com.
- D. MPI (APSM) - Master Painters Institute Architectural Painting Specification Manual; Current Edition, www.paintinfo.com.
- E. SSPC V1 (PM1) - Good Painting Practice: Painting Manual Volume 1; 2024.
- F. SSPC V2 (PM2) - Systems and Specifications: Steel Structures Painting Manual Volume 2; 2021.
- G. SSPC-PA 1 - Shop, Field, and Maintenance Coating of Metals; 2024.
- H. SSPC-PA 2 - Procedure For Determining Conformance To Dry Coating Thickness Requirements; 2015.
- I. SSPC-SP 1 - Solvent Cleaning; 2015.
- J. SSPC-SP 6 - Commercial Blast Cleaning; 2007.

1.03 SUBMITTALS

- A. See Section 013000 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide complete list of all products to be used, with the following information for each:
 - 1. Manufacturer's name, product name and/or catalog number, and general product category (e.g. "alkyd enamel").
 - 2. MPI product number (e.g. MPI #47).
 - 3. Cross-reference to specified coating system(s) product is to be used in; include description of each system.
- C. Samples: Submit two samples 8 by 8 inch in size illustrating colors available for selection.
- D. Manufacturer's Certificate: Certify that products meet or exceed specified requirements.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- F. Maintenance Data: Include cleaning procedures and repair and patching techniques.
- G. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
 - 1. Extra Coating Materials: 1 gallon of each type and color.
 - 2. Label each container with manufacturer's name, product number, color number, and room names and numbers where used.

1.04 QUALITY ASSURANCE

- A. Maintain one copy of each referenced document that applies to application on site.
- B. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum 10 years documented experience.

- C. Applicator Qualifications: Company specializing in performing the work of this section with minimum 5 years documented experience.

1.05 MOCK-UP

- A. See Section 014000 - Quality Requirements, for general requirements for mock-up.
- B. Locate where directed.
- C. Mock-up may remain as part of the work.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container Label: Include manufacturer's name, type of coating, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Coating Materials: Store at minimum ambient temperature of 45 degrees F and a maximum of 90 degrees F, in ventilated area, and as required by manufacturer's instructions.

1.07 FIELD CONDITIONS

- A. Follow manufacturer's recommended procedures for producing best results, including testing of substrates, moisture in substrates, and humidity and temperature limitations.
- B. Do not apply exterior coatings during rain or snow, or when relative humidity is outside the humidity ranges required by the coating product manufacturer.
- C. Do not install materials when temperature is below 55 degrees F or above 90 degrees F.
- D. Maintain this temperature range, 24 hours before, during, and 72 hours after installation of coating.
- E. Restrict traffic from area where coating is being applied or is curing.

1.08 WARRANTY

- A. See Section 017800 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for bond to substrate.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Provide high performance coating products from the same manufacturer to the greatest extent possible.
- B. High-Performance Coatings:
 - 1. Pittsburgh Paints; _____: www.ppgpaints.com/#sle.
 - 2. Sherwin-Williams Company; _____: www.protective.sherwin-williams.com/industries/#sle.
 - 3. Substitutions: Section 016000 - Product Requirements.

2.02 HIGH-PERFORMANCE COATINGS

- A. Provide the following: One top coat and one coat primer.
- B. Note: Certain colors may require multiple coats depending on method of application and finish coat color. When feasible, the preceding coat should be in the same color family (blue, gray, etc.), but noticeably different.
- C. MPI Standards: Provide products that comply with MPI standards indicated and are listed in "MPI Approved Products List."

2.03 TOP COAT MATERIALS

- A. Coatings - General: Provide complete multi-coat systems formulated and recommended by manufacturer for the applications indicated, in the thicknesses indicated; number of coats

specified does not include primer or filler coat.

- B. Epoxy Coating for wet locations:
 - 1. Number of coats: Two.
 - 2. Top Coat(s): High Performance Institutional, Two-Component, Water Based Epoxy Coating; MPI #254.
 - a. Sheen: Eggshell.
 - b. Products:
 - 1) Sherwin-Williams; Pro Industrial Water Based Catalyzed Epoxy; MPI #254: www.protective.sherwin-williams.com/#sle.
- C. Shellac: Pure, white type.

2.04 PRIMERS

- A. Primers: Provide the following unless other primer is required or recommended by coating manufacturer.
 - 1. Block Filler, Latex; MPI #4.
 - a. Products:
 - 1) Sherwin-Williams; PrepRite Interior/Exterior Block Filler; MPI #4: www.protective.sherwin-williams.com/#sle.

2.05 ACCESSORY MATERIALS

- A. Accessory Materials: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials as required for final completion of coated surfaces.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify existing conditions before starting work.
- B. Do not begin application of coatings until substrates have been properly prepared.
- C. Verify that substrate surfaces are ready to receive work as instructed by the coating manufacturer. Obtain and follow manufacturer's instructions for examination and testing of substrates.
- D. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- E. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- F. Proceed with coating application only after unacceptable conditions have been corrected.

3.02 PREPARATION

- A. Clean surfaces of loose foreign matter.
- B. Remove substances that would bleed through finished coatings. If unremovable, seal surface with shellac.
- C. Remove finish hardware, fixture covers, and accessories and store.
- D. Ferrous Metal:
 - 1. Solvent clean according to SSPC-SP 1.
 - 2. Remove rust, loose mill scale, and other foreign substances using methods recommended in writing by paint manufacturer and blast cleaning according to SSPC-SP 6 "Commercial Blast Cleaning", and protect from corrosion until coated.
- E. Protect adjacent surfaces and materials not receiving coating from spatter and overspray; mask if necessary to provide adequate protection. Repair damage.

3.03 PRIMING

- A. Apply primer to all surfaces, unless specifically not required by coating manufacturer. Apply in accordance with coating manufacturer's instructions.

3.04 COATING APPLICATION

- A. Apply coatings in accordance with manufacturer's written instructions, to thicknesses specified and recommendations in "MPI Architectural Painting and Specification Manual".
- B. Apply in uniform thickness coats, without runs, drips, pinholes, brush marks, or variations in color, texture, or finish. Finish edges, crevices, corners, and other changes in dimension with full coating thickness.

3.05 CLEANING

- A. Collect waste material that could constitute a fire hazard, place in closed metal containers, and remove daily from site.
- B. Clean surfaces immediately of overspray, splatter, and excess material.
- C. After coating has cured, clean and replace finish hardware, fixtures, and fittings previously removed.

3.06 PROTECTION

- A. Protect finished work from damage.

END OF SECTION 099600