

MANATEE COUNTY HISTORIC COURTHOUSE

1115 Manatee Avenue West
Bradenton, Florida 34205

Exterior Renovation

PROJECT SPECIFICATIONS



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Coversheet

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SECTION 01 4000 - MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
 - 1. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
 - 2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Related Sections:
 - 1. Divisions 02 through 49 Sections for specific test and inspection requirements.

1.2 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Mockups: Full size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.
 - 1. Laboratory Mockups: Full-size, physical assemblies constructed at testing facility to verify performance characteristics.

- D. Preconstruction Testing: Tests and inspections performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
 - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade or trades.
- J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

- A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

1.4 INFORMATIONAL SUBMITTALS

- A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the following systems.
 - 1. Seismic-force resisting system, designated seismic system, or component listed in the designated seismic system quality assurance plan prepared by the Architect.
 - 2. Main wind-force resisting system or a wind-resisting component listed in the wind-force-resisting system quality assurance plan prepared by the Architect.
- B. Testing Agency Qualifications: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.

1.5 REPORTS AND DOCUMENTS

- A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:
 - 1. Date of issue.
 - 2. Project title and number.
 - 3. Name, address, and telephone number of testing agency.
 - 4. Dates and locations of samples and tests or inspections.
 - 5. Names of individuals making tests and inspections.
 - 6. Description of the Work and test and inspection method.
 - 7. Identification of product and Specification Section.
 - 8. Complete test or inspection data.
 - 9. Test and inspection results and an interpretation of test results.
 - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
 - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
 - 12. Name and signature of laboratory inspector.
 - 13. Recommendations on retesting and reinspecting.
- B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:
 - 1. Name, address, and telephone number of representative making report.
 - 2. Statement on condition of substrates and their acceptability for installation of product.
 - 3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
 - 4. Results of operational and other tests and a statement of whether observed performance complies with requirements.

5. Other required items indicated in individual Specification Sections.

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

1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.
- G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.

2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
1. Contractor responsibilities include the following:
 - a. Provide test specimens representative of proposed products and construction.
 - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
 - c. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
 - d. When testing is complete, remove test specimens, assemblies, mock-ups, do not reuse products on Project.
 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect with copy to contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.
- J. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
 2. Notify Architect seven<7> days in advance of dates and times when mockups will be constructed.
 3. Demonstrate the proposed range of aesthetic effects and workmanship.
 4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
 - a. Allow **seven** <7> days for initial review and each re-review of each mockup.
 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 6. Demolish and remove mockups when directed, unless otherwise indicated.

- K. Laboratory Mockups: Comply with requirements of preconstruction testing and those specified in individual Specification Sections in Divisions 02 through 49.

1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
 2. Costs for retesting and re-inspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
 - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
 2. Notify testing agencies at least Twenty-Four <24> hours in advance of time when Work that requires testing or inspecting will be performed.
 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
 5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.
- D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. Testing Agency Responsibilities: Cooperate with Architect, and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect, and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
 2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
 3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
 4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
 5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
 6. Do not perform any duties of Contractor.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
1. Access to the Work.
 2. Incidental labor and facilities necessary to facilitate tests and inspections.
 3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
 4. Facilities for storage and field curing of test samples.
 5. Delivery of samples to testing agencies.
 6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
 7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- 1.8 SPECIAL TESTS AND INSPECTIONS
- A. Special Tests and Inspections: **Engage** a qualified **testing agency** to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
- B. Special Tests and Inspections: Conducted by a qualified **testing agency** as required by authorities having jurisdiction, as indicated in individual Specification Sections, and as follows:
1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.

2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
 1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend Renovation into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Division 01 Section "Execution."
- B. Protect construction exposed by or for quality-control service activities.
- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

END OF SECTION 01 4000

SECTION 02 4119 – SELECTIVE STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review structural load limitations of existing structure.
 - 3. Review and finalize selective demolition schedule and verify availability of materials, demolition personnel, equipment, and facilities needed to make progress and avoid delays.
 - 4. Review requirements of work performed by other trades that rely on substrates exposed by selective demolition operations.
 - 5. Review cleaning methods for brick.

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control and, for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:

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1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's on-site operations are uninterrupted.
 2. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Pre-demolition Photographs or Video: Submit before Work begins.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.
- B. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Hazardous materials are present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials is on file for review and use. Examine report to become aware of locations where hazardous materials are present.
 1. Hazardous material remediation is specified elsewhere in the Contract Documents.
 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 3. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review record documents of existing construction provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in record documents.
- C. Survey existing conditions and correlate with requirements indicated to determine extent of selective demolition required.
- D. When unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure the nature and extent of conflict. Promptly submit a written report to Architect.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs and templates.

3.2 PREPARATION

- A. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- B. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
 - 1. Strengthen or add new supports when required during progress of selective demolition.

3.3 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain fire watch and portable fire-suppression devices during flame-cutting operations.
3. Maintain adequate ventilation when using cutting torches.
4. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
5. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
6. Dispose of demolished items and materials promptly.

3.4 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- D. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. Remove existing roof membrane, flashings, copings, and roof accessories. Provide temporary weather protection until new roof is installed by Owner.
 1. Remove existing roofing system down to substrate.
- E. Removed and Salvaged Items (brick):
 1. Clean salvaged items.
 2. Pack on pallets after cleaning. .
 3. Store items in a secure area until reinstallation.
 4. Protect items from damage during storage.

3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site and legally dispose of them in an EPA-approved landfill.
 1. Do not allow demolished materials to accumulate on-site.

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2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.6 CLEANING

A. Clean adjacent structures and improvements of dust, dirt, and debris caused by selective demolition operations. Return adjacent areas to condition existing before selective demolition operations began.

END OF SECTION 02 4119

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SECTION 03 3053 - MISCELLANEOUS CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Other Action Submittal:
 - 1. Design Mixtures: For each concrete mixture.

1.4 QUALITY ASSURANCE

- A. Ready-Mix-Concrete Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
- B. Comply with the following sections of ACI 301, unless modified by requirements in the Contract Documents:
- C. Comply with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."

PART 2 - PRODUCTS

2.1 FORMWORK

- A. Furnish formwork and formwork accessories according to ACI 301.

2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- B. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.

2.3 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type,

brand, and source throughout Project:

1. Portland Cement: ASTM C 150, Type I/II.

B. Normal-Weight Aggregate: ASTM C 33, graded, 1-1/2-inch nominal maximum aggregate size.

C. Water: ASTM C 94/C 94M.

2.4 ADMIXTURES

A. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.

2.5 CURING MATERIALS

A. Evaporation Retarder: Waterborne, monomolecular film forming; manufactured for application to fresh concrete.

B. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

2.6 CONCRETE MIXTURES

A. Comply with ACI 301 requirements for concrete mixtures.

B. Normal-Weight Concrete: Prepare design mixes, proportioned according to ACI 301, as follows:

1. Minimum Compressive Strength: 3500 psi at 28 days.

2. Maximum Water-Cementitious Materials Ratio: 0.45.

3. Slump Limit: 4 inches, plus or minus 1 inch.

4. Air Content: Maintain within range permitted by ACI 301. Do not allow air content of trowel-finished floor slabs to exceed 3 percent.

2.7 CONCRETE MIXING

A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.

1. When air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.1 FORMWORK

A. Design, construct, erect, brace, and maintain formwork according to ACI 301.

3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

3.3 STEEL REINFORCEMENT

- A. Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
 - 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.4 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Locate and install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

3.5 CONCRETE PLACEMENT

- A. Comply with ACI 301 for placing concrete.
- B. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
- C. Do not add water to concrete during delivery, at Project site, or during placement.
- D. Consolidate concrete with mechanical vibrating equipment.

3.6 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defective areas repaired and patched. Remove fins and other projections exceeding 1/2 inch.
- B. 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.

3.7 FINISHING UNFORMED SURFACES

- A. General: Comply with ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Screed surfaces with a straightedge and strike off. Begin initial floating using bull

floats or darbies to form a uniform and open-textured surface plane before excess moisture or bleedwater appears on surface.

1. Do not further disturb surfaces before starting finishing operations.

- C. Float Finish: 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, fluid-applied or direct-to-deck-applied membrane roofing, or sand-bed terrazzo.

3.8 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Begin curing after finishing concrete but not before free water has disappeared from concrete surface.

3.9 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Tests: Perform according to ACI 301.
1. Testing Frequency: One composite sample shall be obtained for each day's pour of each concrete mix exceeding 5 cu. yd. but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 2. Testing Frequency: One composite sample shall be obtained for each 100 cu. yd. or fraction thereof of each concrete mix placed each day.

3.10 REPAIRS

- A. Remove and replace concrete that does not comply with requirements in this Section.

END OF SECTION 03 3053

SECTION 03 4900 - GLASS-FIBER-REINFORCED CONCRETE (GFRC)

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 glass-fiber-reinforced concrete (GFRC) panels consisting of GFRC panel frames, anchors, and connection hardware.
 - 1. GFRC panels include fascia units cornices soffits Frieze.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: GFRC panels, including panel frames, anchors, and connections, shall withstand the following design loads as well as the effects of thermal- and moisture-induced volume changes, according to load factors and combinations established in PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels."
 - 1. Loads shall be as indicated and as required by the Florida Building Code.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include GFRC design mixes.
- B. Shop Drawings: Show fabrication and installation details for GFRC panels including the following:
 - 1. Structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
 - 2. Panel elevations, sections, and dimensions.
 - 3. Thickness of facing mix, GFRC backing, and bonding pads for typical panels.
 - 4. Finishes.
 - 5. Joint and connection details.
 - 6. Erection details.
 - 7. Description of loose, cast-in, and field hardware.
- C. Samples: Representative of finished exposed face of GFRC showing the full range of colors and textures specified, 12 by 12 inches and of actual thickness.
- D. Provide a Miami-Dade County or State of Florida NOA.

1.5 QUALITY ASSURANCE

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- A. Manufacturer Qualifications: A qualified manufacturer that participates in PCI's Plant Certification Program and is designated a PCI-Certified Plant for Group G - Glass Fiber Reinforced Concrete or that participates in APA's Plant Certification Program and is certified for GFRC production.
 - 1. Manufacturer's responsibility includes fabricating and installing GFRC panels and providing professional engineering services needed to assume engineering responsibility for GFRC panels.
 - 2. Engineering responsibility includes preparation of Shop Drawings and comprehensive engineering analysis, based on GFRC production test values, by a qualified professional engineer experienced in GFRC design.
 - B. Source Limitations: Obtain GFRC panels from single source from single manufacturer.
 - C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," and AWS D1.3, "Structural Welding Code - Sheet Steel."
 - D. PCI Manuals: Comply with requirements and recommendations in the following PCI manuals unless more stringent requirements are indicated:
 - 1. PCI MNL 128, "Recommended Practice for Glass Fiber Reinforced Concrete Panels."
 - 2. PCI MNL 130, "Manual for Quality Control for Plants and Production of Glass Fiber Reinforced Concrete Products."
 - E. AISI Specifications: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
 - F. Mockups: Build mockups to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockup of typical wall area as shown on Drawings separately from building.
 - 2. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.
 - G. Preinstallation Conference: Conduct conference at Project site.
- 1.6 DELIVERY, STORAGE, AND HANDLING
- A. Handle and transport GFRC panels to avoid damage.
 - 1. Place nonstaining resilient spacers between panels.
 - 2. Support panels on nonstaining material during shipment.
 - 3. Protect panels from dirt and damage during handling and transport.
 - B. Store GFRC panels to protect from contact with soil, staining, and physical damage.
 - 1. Store panels with nonstaining resilient supports in same positions as when transported.
 - 2. Store panels on firm, level, and smooth surfaces.
 - 3. Place stored panels so identification marks are clearly visible.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. GFRC Cladding Systems
 2. Stromberg Architectural Products
 3. Formglas

2.2 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, nonabsorptive material, warp and buckle free, that will provide continuous and true GFRC surfaces; nonreactive with GFRC and capable of producing required finish surfaces.
1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain, or adversely affect GFRC surfaces and will not impair subsequent surface or joint treatments of GFRC.
- B. Form Liners: Units of face design, texture, arrangement, and configuration indicated to match existing triom texture and color. Provide solid backing and form supports to ensure that form liners remain in place during GFRC application. Use with manufacturer's recommended liquid-release agent that will not bond with, stain, or adversely affect GFRC surfaces and will not impair subsequent surface or joint treatments of GFRC.

2.3 GFRC MATERIALS

- A. Portland Cement: ASTM C 150; Type I.
1. For surfaces exposed to view in finished structure, use white of same type, brand, and source throughout GFRC production.
 2. Metakaolin: ASTM C 618, Class N.
- B. Glass Fibers: Alkali resistant, with a minimum zirconia content of 16 percent, 1 to 2 inches long, specifically produced for use in GFRC, and complying with PCI MNL 130.
- C. Sand: Washed and dried silica, complying with composition requirements in ASTM C 144; passing No. 16 sieve.
- D. Facing Aggregate: ASTM C 33, except for gradation, and PCI MNL 130, 1/2-inch maximum size.
1. Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match sample.
- E. Coloring Admixture: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures, temperature stable, nonfading, and alkali resistant.

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- F. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of GFRC and complying with chemical limits of PCI MNL 130.

2.4 ANCHORS, CONNECTORS, AND MISCELLANEOUS MATERIALS (Base Bid)

- A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M. Finish steel shapes and plates less than 3/16 inch thick as follows:
 - 1. Finish: Zinc coated by hot-dip process according to ASTM A 123/A 123M, after fabrication, or ASTM A 153/A 153M, as applicable.
- B. Bolts: ASTM A 307 or ASTM A 325.
 - 1. Finish: Zinc coated by hot-dip process according to ASTM A 123/A 123M, after fabrication, and ASTM A 153/A 153M, as applicable.

2.5 ANCHORS, CONNECTORS, AND MISCELLANEOUS MATERIALS (Alternate 1)

- A. Steel Shapes and Plates: 300 series stainless steel.
- B. Bolts: 400 series stainless steel.

2.6 PANEL FRAME MATERIALS

- A. Cold-Formed Steel Framing: Manufacturer's standard C-shaped steel studs, complying with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members," minimum uncoated steel thickness of 0.053 inch of web depth indicated, with stiffened flanges, U-shaped steel track, and of the following steel sheet:
 - 1. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, structural-steel sheet, G90 zinc coating, of grade required by structural performance of framing.
- B. Provide alternate for Stainless steel frame materials.

2.7 GFRC MIXES

- A. Backing Mix: Proportion backing mix of portland cement, glass fibers, sand, and admixtures to comply with design requirements. Provide nominal glass-fiber content of not less than 5 percent by weight of total mix.
- B. Face Mix: Proportion face mix of portland cement, sand, facing aggregates, and admixtures to comply with design requirements.
- C. Polymer-Curing Admixture: 6 to 7 percent by weight of polymer-curing admixture solids to dry portland cement.
- D. Air Content: 8 to 10 percent; ASTM C 185.
- E. Coloring Admixture: Not to exceed 10 percent of cement weight.

2.8 PANEL FRAME FABRICATION

- A. Fabricate panel frames and accessories plumb, square, true to line, and with components securely fastened, according to Shop Drawings and requirements in this Section.
 - 1. Fabricate panel frames using jigs or templates.
 - 2. Cut cold-formed metal framing members by sawing or shearing; do not torch cut.
 - 3. Fasten cold-formed metal framing members by welding. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - 4. Fasten framing members of hollow structural sections, steel channels, or steel angles by welding. Comply with AWS D1.1/D1.1M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
 - 5. Weld flex, gravity, and seismic anchors to panel frames.
- B. Reinforce, stiffen, and brace framing assemblies, if necessary, to withstand handling, delivery, and erection stresses. Lift fabricated assemblies in a manner that prevents damage or significant distortion.
- C. Galvanizing Repair: Touch up accessible damaged galvanized surfaces according to ASTM A 780.

2.9 MOLD FABRICATION

- A. Construct molds that will result in finished GFRC complying with profiles, dimensions, and tolerances indicated, without damaging GFRC during stripping. Construct molds to prevent water leakage and loss of cement paste.
 - 1. Coat contact surfaces of molds with form-release agent.
 - 2. Coat contact surfaces of molds with surface retarder.
- B. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during GFRC application. Coat form liner with form-release agent.
- C. Locate, place, and secure flashing reglets accurately.

2.10 GFRC FABRICATION

- A. Proportioning and Mixing: For backing mix, meter sand/cement slurry and glass fibers to spray head at rates to achieve design mix proportions and glass-fiber content according to PCI MNL 130 procedures.
- B. Spray Application: Comply with general procedures as follows:
 - 1. Spray mist coat over molds to a nominal thickness of 1/8 inch on planar surfaces.
 - 2. Spray or place face mix in thickness indicated on Shop Drawings.
 - 3. Proceed with spraying backing mix before face mix has set, using procedures that produce a uniform thickness and even distribution of glass fibers and matrix.
 - 4. Consolidate backing mix by rolling or other technique to achieve complete encapsulation of glass fibers and compaction.

5. Measure thickness with a pin gage or other acceptable method at least once for each 5 sq. ft. of panel surface. Take not less than six measurements per panel.
- C. Hand form and consolidate intricate details, incorporate formers or infill materials, and over spray before material reaches initial set to ensure complete bonding.
- D. Attach panel frame to GFRC before initial set of GFRC backing, maintaining a minimum clearance of 1/2 inch from GFRC backing, and without anchors protruding into GFRC backing.
- E. Inserts and Embedments: Build up homogeneous GFRC bosses or bonding pads over inserts and embedments to provide sufficient anchorage and embedment to comply with design requirements.
- F. Curing: Employ initial curing method that will ensure sufficient strength for removing units from mold. Comply with PCI MNL 130 procedures.
- G. Panel Identification: Mark each GFRC panel to correspond with identification mark on Shop Drawings. Mark each panel with its casting date.

2.11 FABRICATION TOLERANCES

- A. Manufacturing Tolerances: Manufacture GFRC panels so each finished unit complies with PCI MNL 130 for dimension, position, and tolerances.
- B. Position Tolerances: Measured from datum line locations, as indicated on Shop Drawings.
 1. Panel Frame and Track: Plus or minus 1/4 inch.
 2. Flashing Reglets at Edge of Panel: Plus or minus 1/4 inch.
 3. Inserts: Plus or minus 1/2 inch.
 4. Special Handling Devices: Plus or minus 3 inches.
 5. Location of Bearing Devices: Plus or minus 1/4 inch.
 6. Blockouts: Plus or minus 3/8 inch.
- C. Panel Frame Tolerances: As follows:
 1. Vertical and Horizontal Alignment: 1/4 inch per 10 feet.
 2. Spacing of Framing Member: Plus or minus 3/8 inch.
 3. Squareness of Frame: Difference in length of diagonals of 3/8 inch.
 4. Overall Size of Frame: Plus or minus 3/8 inch.

2.12 FINISHES

- A. Finish exposed-face surfaces of GFRC as follows to match approved design reference sample and mockups. Panel faces shall be free of joint marks, grain, or other obvious defects.
 1. Design Reference Sample: Existing cornice material.
 2. As-Cast-Surface Finish: Provide free of sand streaks, honeycombs, and excessive air voids, with uniform color and texture.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine structure and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

- A. Install clips, hangers, and other accessories required for connecting GFRC panels to supporting members and backup materials.
- B. Lift GFRC panels and install without damage.
- C. Install GFRC panels level, plumb, square, and in alignment. Provide temporary supports and bracing as required to maintain position, stability, and alignment of panels until permanent connections are completed.
 - 1. Maintain horizontal and vertical joint alignment and uniform joint width.
 - 2. Remove projecting hoisting devices.
- D. Connect GFRC panels in position by bolting or welding, or both, as indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as possible after connecting is completed.
- E. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.3 requirements for welding, appearance, quality of welds, and methods used in correcting welding work.
 - 1. Protect GFRC panels from damage by field welding or cutting operations, and provide noncombustible shields as required.
- F. At bolted connections, use lock washers or other acceptable means to prevent loosening of nuts.

3.3 ERECTION TOLERANCES

- A. Erect GFRC panels to comply with the following noncumulative tolerances:
 - 1. Plan Location from Building Grid Datum: Plus or minus 1/2 inch.
 - 2. Top Elevation from Nominal Top Elevation: As follows:
 - a. Exposed Individual Panel: Plus or minus 1/4 inch.
 - b. Nonexposed Individual Panel: Plus or minus 1/2 inch.
 - c. Exposed Panel Relative to Adjacent Panel: 1/4 inch.
 - d. Nonexposed Panel Relative to Adjacent Panel: 1/2 inch.
 - 3. Support Elevation from Nominal Elevation: As follows:
 - a. Maximum Low: 1/2 inch.
 - b. Maximum High: 1/4 inch.

4. Maximum Plumb Variation over the Lesser of Height of Structure or 100 Feet: 1 inch.
5. Plumb in Any 10 Feet of Element Height: 1/4 inch.
6. Maximum Jog in Alignment of Matching Edges: 1/4 inch.
7. Maximum Jog in Alignment of Matching Faces: 1/4 inch.
8. Face Width of Joint: As follows (governs over joint taper):
 - a. Panel Dimension 20 Feet or Less: Plus or minus 1/4 inch.
 - b. Panel Dimension More Than 20 Feet: Plus or minus 5/16 inch.
9. Maximum Joint Taper: 3/8 inch.
10. Joint Taper in 10 Feet: 1/4 inch.
11. Differential Bowing, as Erected, between Adjacent Members of Same Design: 1/4 inch.

3.4 REPAIRS

- A. Repairs will be permitted provided structural adequacy of GFRC panel and appearance are not impaired, as approved by Architect.
- B. Mix patching materials and repair GFRC so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces.
- C. Prepare and repair accessible damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
- D. Remove and replace damaged GFRC panels when repairs do not comply with requirements.

3.5 CLEANING AND PROTECTION

- A. Perform cleaning procedures, if necessary, according to GFRC manufacturer's written instructions. Clean soiled GFRC surfaces with detergent and water, using soft fiber brushes and sponges, and rinse with clean water. Prevent damage to GFRC surfaces and staining of adjacent materials.

END OF SECTION 03 4900

SECTION 04 2000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 1. Concrete masonry units.
 2. Face brick.
 3. Mortar and grout.
 4. Masonry joint reinforcement.
 5. Ties and anchors.
 6. Embedded flashing.
 7. Miscellaneous masonry accessories.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
 1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.
- B. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- C. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.

- D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers designed for use with dispensing silos. Store preblended, dry mortar mix in delivery containers on elevated platforms, under cover, and in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 - 1. Extend cover a minimum of 24 inches down both sides of walls and hold cover securely in place.
 - 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches down face next to unconstructed wythe and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 - 2. Protect sills, ledges, and projections from mortar droppings.
 - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
 - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
 - 1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C 90.
 - 1. Density Classification: Normal weight.
 - 2. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

2.3 BRICK

- A. General: Reuse existing cleaned brick. Additional brick shall match existing and shall be used in areas not readily visible.

2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, Provide natural color or white cement as required to produce mortar color indicated. Color shall match existing
- B. Hydrated Lime: ASTM C 207, Type S.

- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979. Use only pigments with a record of satisfactory performance in masonry mortar.
- E. Colored Cement Product: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
 - 1. Formulate blend as required to produce color indicated , color shall match existing mortar..
 - 2. Pigments shall not exceed 10 percent of portland cement by weight.
- F. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
 - 2. For joints less than 1/4 inch thick, use aggregate graded with 100 percent passing the No. 16 sieve.
- G. Aggregate for Grout: ASTM C 404.
- H. Water: Potable.
- I. Bonding additive: Anti Hydro.

2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60.
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Exterior Walls: Stainless steel.
 - 2. Wire Size for Side Rods: 0.187-inch diameter.
 - 3. Wire Size for Cross Rods: 0.148-inch diameter.
 - 4. Wire Size for Veneer Ties: 0.187-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.
- C. Masonry Joint Reinforcement for Multiwythe Masonry:
 - 1. Adjustable (two-piece) type, truss design, with one side rod at each face shell of backing wythe and with separate adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches. Size ties to extend at least halfway through facing wythe but with at least 5/8-inch cover on outside face.

2.6 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
 - 1. Stainless-Steel Wire: ASTM A 580/A 580M, Type 304.
- B. Wire Ties, General: Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches parallel to face of veneer.
- C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches wide.
 - 1. Where wythes are of different materials, use adjustable ties with pintle-and-eye connections having a maximum adjustment of 1-1/4 inches.
 - 2. Wire: Fabricate from 3/16-inch- diameter, stainless-steel wire.

2.7 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with SMACNA's "Architectural Sheet Metal Manual" and as follows:
 - 1. Stainless Steel: ASTM A 240/A 240M, Type 304, 0.016 inch thick.
 - 2. Fabricate continuous flashings in sections 96 inches long minimum, but not exceeding 12 feet. Provide splice plates at joints of formed, smooth metal flashing.
 - 3. Fabricate through-wall metal flashing embedded in masonry from stainless steel, with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond.
 - 4. Fabricate through-wall flashing with snaplock receiver on exterior face where indicated to receive counterflashing.
 - 5. Fabricate through-wall flashing with drip edge where indicated. Fabricate by extending flashing 1/2 inch out from wall, with outer edge bent down 30 degrees.
- B. Solder and Sealants for Sheet Metal Flashings:
 - 1. Solder for Stainless Steel: ASTM B 32, Grade Sn60, with acid flux of type recommended by stainless-steel sheet manufacturer.
 - 2. Elastomeric Sealant: ASTM C 920, chemically curing urethane sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- C. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Weep/Vent Products: Use the following unless otherwise indicated:
 - 1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch less than depth of outer wythe, in color selected from manufacturer's standard.

2.9 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.10 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
 2. Use portland cement-lime mortar unless otherwise indicated.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.
1. For reinforced masonry, use Type S.
 2. For brick work mixing water shall be mixed 1 part anti Hydro to 3 parts water.
 3. Bonding coat for brick shall be a mix that is pancake batter consistency of 1 part anti Hydro, 3 parts water and portland cement.
- C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
1. Pigments shall not exceed 10 percent of portland cement by weight.
 2. Mix to match Architect's sample.
 3. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Face brick.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
 2. Proportion grout in accordance with ASTM C 476, Table 1.
 3. Provide grout with a slump of 10 to 11 inches as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
1. Verify that reinforcing dowels are properly placed.

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

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown.
- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- C. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
- D. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.
- E. Wetting of Brick: coat surfaces of brick in contact with mortar with bonding coat.

3.3 TOLERANCES

- A. 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 alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet, or 1/2 inch maximum.
 - 4. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch except due to warpage of masonry units within tolerances specified for warpage of units.
- B. 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, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond Brick bond pattern shall match existing, do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches. Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
 - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
 - 2. With webs fully bedded in mortar in all courses.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

3.6 COMPOSITE MASONRY

- A. Bond wythes of composite masonry together using one of the following methods:
 - 1. Masonry Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of wythes do not align, use adjustable (two-piece) type reinforcement.
- B. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.
 - 1. Provide continuity with masonry joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.

3.7 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch on exterior side of walls, 1/2 inch elsewhere. Lap reinforcement a minimum of 6 inches.
 - 1. Space reinforcement not more than 8 inches o.c. in parapet walls.

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

3.8 LINTELS

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

3.9 FLASHING, WEEP HOLES, CAVITY DRAINAGE, AND VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.

- B. Install flashing as follows unless otherwise indicated:

1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 4 inches, and 1-1/2 inches into the inner wythe.
3. At lintels and shelf angles, extend flashing a minimum of 6 inches into masonry at each end. At heads and sills, extend flashing 6 inches at ends and turn up not less than 2 inches to form end dams.
4. Interlock end joints of ribbed sheet metal flashing by overlapping ribs not less than 1-1/2 inches or as recommended by flashing manufacturer, and seal lap with elastomeric sealant complying with requirements in Division 07 Section "Joint Sealants" for application indicated.
5. Install metal [**drip edges**] [**and**] [**sealant stops**] with ribbed sheet metal flashing by interlocking hemmed edges to form hooked seam. Seal seam with elastomeric sealant.

- C. Install reglets and nailers for flashing and other related construction where they are shown to be built into masonry.

- D. Install weep holes in head joints in exterior wythes of first course of masonry immediately above embedded flashing and as follows:

1. Use specified weep/vent products to form weep holes.
2. Space weep holes 24 inches o.c. unless otherwise indicated.

3.10 REINFORCED UNIT MASONRY INSTALLATION

- A. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.

- B. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.

1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

3.11 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Testing Prior to Construction: One set of tests.
- C. Testing Frequency: One set of tests for each 5000 sq. ft. of wall area or portion thereof.
- D. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.
- E. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

3.12 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
 - 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
 - 5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
 - 6. Clean masonry with a proprietary acidic cleaner applied according to manufacturer's written instructions.

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7. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

END OF SECTION 04 2000

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SECTION 05 5000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Shelf angles.
- B. Products furnished, but not installed, under this Section:
 - 1. Loose steel lintels.

1.3 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for metal fabrications.
 - 1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication.

1.5 COORDINATION

- A. Coordinate installation of anchorages and steel weld plates and angles , Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

PART 2 - PRODUCTS

2.1 METALS, GENERAL

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

2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use
- B. Stainless-Steel Bolts and Nuts: Regular hexagon-head annealed stainless-steel bolts, ASTM F 593; with hex nuts, ASTM F 594; and, where indicated, flat washers; Alloy Group 1.
- C. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- D. Post-Installed Anchors: chemical anchors.
 - 1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing.

- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) fasteners unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

2.6 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch bolts, spaced not more than 6 inches from ends and 24 inches o.c., unless otherwise indicated.
 - 1. Provide mitered and welded units at corners.
 - 2. Provide open joints in shelf angles at expansion and control joints. Make open joint approximately 2 inches larger than expansion or control joint.
- B. Galvanize shelf angles..
- C. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

2.7 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Fabricate in single lengths for each opening unless otherwise indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches unless otherwise indicated.
- C. Galvanize loose steel lintels.

2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

2.9 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
 - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
 - 2. Obtain fusion without undercut or overlap.
 - 3. Remove welding flux immediately.
 - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

3.2 ADJUSTING AND CLEANING

- A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION 05 5000

SECTION 06 1053 - MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Wood blocking and nailers.

1.3 DEFINITIONS

- A. Lumber grading agencies, and the abbreviations used to reference them, include the following:
 - 1. NHLA: National Hardwood Lumber Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
 - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
 - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For the following, from ICC-ES:
 - 1. Preservative-treated wood.
 - 2. Powder-actuated fasteners.

1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Stack lumber flat with spacers beneath and between each bundle to provide air circulation. Protect lumber from weather by covering with waterproof sheeting, securely anchored. Provide for air circulation around stacks and under coverings.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
 - 1. Factory mark each piece of lumber with grade stamp of grading agency.
 - 2. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
 - 3. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

- A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2.
 - 1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Application: Treat all miscellaneous carpentry unless otherwise indicated.

2.3 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
 - 1. Blocking.
 - 2. Nailers.
 - 3. Cants.
- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.
- C. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

- D. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Do not splice structural members between supports unless otherwise indicated.
- D. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
- E. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- F. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
 - 1. Use inorganic boron for items that are continuously protected from liquid water.
 - 2. Use copper naphthenate for items not continuously protected from liquid water.
- G. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 - 2. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

3.2 PROTECTION

- A. Protect wood that has been treated with inorganic boron (SBX) from weather. If, despite protection, inorganic boron-treated wood becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.
- B. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 1053

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PART 1 - GENERAL

A. Selective Demolition

1. Refer to Roof Plans & Detail Drawings. Ref: Drawing Notes.
2. Install protective ground net tarpaulins below all areas of immediate demolition.
3. Install protective floor runners:
 - a. Between elevator & ground entrance.
 - b. Between elevator & roof hatch entrance.
 - c. On elevator floor (cover completely).
 - d. On roof access landing floor (cover completely).
4. Install Caution Tape & protective tarpaulins on paved areas directly below locale of immediate demolition & crane activity.
5. Crane activity:
 - a. Immediately sand & cleanup any hydraulic fluid leakage.
 - b. Place 2" plywood pads under outriggers.
6. Locate sprinkler heads around building perimeter work area and clearly mark or flag.
7. Remove all debris and dirt from roof level to ground level by means of chute or other approved, closed conveyance, directly into truck, trailer or dumpster.
8. Remove & discard:

Built-up Roof Systems to Deck	Base Flashings	*Wall Flashings
Gravel stop	Soil stack lead collars	Insulation vents
Counterflashings	Abandoned fixtures - Roof & Walls	
* In event of plywood covering walls, reasonably sound existing materials may remain in place.		

9. Remove no more materials from roof area than can be completely sealed to a watertight condition (with a proper night seal - See Detail Drawing No. 3.0) in one days working time, or prior to the onset of inclement weather.
10. Inspect & clean up grounds on a continuing basis. Leave grounds clean at the end of each working day. Dispose of all removed dirt, trash, and debris off-site.
11. Operate nail magnet on regular basis below tear-off areas continuously throughout work day.

PART 2 - PRODUCTS & EXECUTION

A. Fasteners

1. Flashing metal-to-masonry: 2" x 1/4" dia. Aluminum drive pins.
2. Wood curb and platform fasteners shall be 6d and 8d galvanized nails.
3. Aluminum Clad metal: 6d, Stainless Steel spiral shank nails.
4. Hoods & Equipment Platform Covers: #12 Stainless Steel screws with gaskets.
5. Refer to Detail Drawings for specific location, pattern and frequency of fasteners.

B. Night Seal / Tie-In

1. A 24" wide tie-in area shall be established on the remaining existing roof membrane surface adjacent to the roof removal area.
2. The existing roof membrane & the new roof membrane shall be elevated, overlapped & sealed with spray foam per the attached Detail Drawing No. 3.0.

C. Wood Nailers & Curbs

1. All new nailers and curbs shall be pressure treated lumber.
2. Hidden defective wood nailers & curbs shall be repaired/replaced with like size as Unit

D. Extras.

1. Nailers may be added to sound existing equipment mount curbs to achieve parameters of Detail Drawing No. 10.0.

E. Insulation, Roof Slope, & Drainage Ref: Roof Plan No. 1.2

1. Insulation shall be Iso-Board as approved by the membrane manufacturer to qualifying the system for the U.L. Class A Fire Rating as listed with the Underwriters Laboratories.

2. SUMMER "R"- CALCULATIONS

COMPONENT	"R"-VALUE
Outside Air Film	0.25
New Single Ply Roof Membrane	0.22
3.75" Avg. New IsoBoard Insul.	26.25
4" concrete deck	0.33
Airspace & Slope Fill (Est.)	1.50
6" Concrete sub-deck (Est.)	0.50
4" Airspace	0.99

Acoustical Ceiling Tile	2.00
Inside Air Film	0.92
TOTAL "R" VALUE (RT±)	3 2 . 9 6

3. Adhere 4'x4' insulation panels with manufacturer's approved foam adhesive, ribbons 12" O/C - 8'x8' at outside corners; 4' - balance of perimeter; 18" O/C - field of roof. Stagger panels 2' in one direction.
4. Immediately weight corners & center of panel with 25 lb. shot bags or other appliance of equal weight. Add more as needed in deflected areas. Allow weights to remain in place 5 - 8 minutes.
5. Insulation shall be min. 2" thick Iso-board, unless otherwise required by membrane manufacturer.
6. Insulation shall be Reslope tapered as below:
7. Roof Area B - 1/8" per ft.; 1/4" per ft. counterslope.
8. All other roof areas - 1/4" per ft.; 1/2" per ft counterslope.
9. Note that all counter-slopes shall be set at 45° angles.
10. Some drain lines and stop points do not line up vertically. Wood curbs shall be installed to smooth such transitions.
11. Submittal Required: [3 Sets] Literature & Spec. Data, only:
 - a) Insulation manufacturer data.
 - b) Membrane manufacturer attachment layout and statement of insulation approval.

F. Roof Membrane

1. New flashing membrane is now in place on the Machine Room (Roof Area D), 4 Mechanical Unit curbs (Roof Areas B & E) & Parapet walls. Ref: §7.02 for description of material.
2. Roof membrane shall be a single ply panel system: 45 mil, Fleece-Back "Fibertite" as manufactured by Seaman Corp., maintaining the Manufacturer's 20 year (N.D.L.) warrantee.
 - a) Install membrane with No. 290 adhesive to both surfaces (membrane & parapet) in a manner to minimize laps bucking water flow to drain.
 - b) Installed in compliance with the manufacturer's High-Wind Fully Adhered Securement Design. Ref: Detail Drawing No. 2.0.
3. Install membrane in a manner to minimize laps bucking water flow to drain.
4. Membrane field seams shall lap 4" minimum, staggering factory seams.
5. Heat weld [hot air] all membrane field seams solid, excluding all voids.

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6. Install membrane waterproof cutoffs at the end of each days work per attached Detail Drawing No. 3.0.
7. Specified manufacturer's instructions & application manual are incorporated as part of these documents. Submittal Required.

G. Drip Edge: Ref: Detail Drawing No. 5.0. - Roof Plan Drawings 1.2 & 1.4.

1. Install 6" wide (2" X 6" is minimum) compound nailer / Curb at roof edge. Nailer shall be thick enough to provide curb even with, or (or slightly below) thickest point of insulation. Detail Drawing No. 5.0 shows average to minimum condition.
2. Reslope designated areas per Roof Plan Drawing No. 1.2.
3. Install roof membrane over nailers & down outside wall face 2"(±) & nail off.
4. Install 1-piece Aluminum Clad-metal drip edge closure with continuous cleat behind vertical face plate per Detail Drawing No. 5.0 Adjust to accommodate field conditions.
5. Note: Fabricate metal edge so that bottom lip extends below prior location and/or any voids in top of wall.

H. Wall Base Flashings:

1. Wall base cavity: Shim out even with existing wall surface w/exterior grade plywood, attached w/1/4" Dia. alum. drive pins.
2. Refer to Detail Drawing No. 10.0. Roof Areas B & E. Counterflashing shall be 0.040 Aluminum factory enamel both sides. Color on exposed side - Cream or Off-white.

I. Exhaust Fans Exhaust fans shall be reinstalled with new curbs per: Detail Drawings No's. 11.0 & 11.1.

J. Abandoned Roof Deck Openings (5): Openings shall be covered with 3/4" exterior grade plywood per: Detail Drawing No. 4.0.

K. Miscellaneous Equipment Mounts & Roof Penetrations

1. Soil stacks within 8' of a vent or exhaust fan: Extend neoprene union & PVC extension as required to provide a minimum nominal height of 36" above the intake or exit.
2. Install new soil stack flashing per attached Detail Drawing No. 14.0.
3. Note abandoned hangers, eye bolts & anchors in parapet walls. Remove & seal.
4. Install (smaller) Condensate drain lines & electrical conduit, etc. per Detail Drawing No. 16.0.

L. Internal Roof Drains

1. Replace missing &/or damaged drain screen baskets & clamping rings with new cast iron, painted 2 coats with high-grade aluminum enamel (2 lbs to 3 lbs of aluminum per gallon).
2. Clean & paint existing drain screen baskets & clamping rings with 2 coats with high-grade aluminum enamel (2 lbs to 3 lbs of aluminum per gallon).
3. Repair & replace all missing clamp ring bolts. Install broad washers with all bolts.
4. Install roof system & reinstall clamping rings & baskets per Detail Drawing No.13.0.
5. Should defective drain bowls be discovered, immediately notify consultant for review & approval.

M. Roof Protection Boards, Step Bridges & Mfr. Caution Signs

1. Detail Drawing No. 17.0: Install Manufacturer approved protection board (Fibertite yellow, 1/2''(±)X2'X4 walk board). Ref: Roof Plan Drawing No. 1.5 for locations.
2. Install walk boards to provide path from access door to equipment & surrounding all equipment.
3. Install step bridges per Roof Plan Drawing No. 1.5 locations.
4. Install Manufacturer's roof notice precautionary signs to roof membrane in a conspicuous location on each roof or inside each roof access door.

END OF SECTION 07 5010

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PART 1 - GENERAL

A. Roof Deck

1. Exposed roof deck area at base of parapet shall be examined for soft &/or possibly defective roof deck conditions.
2. Surface damage, irregularities; pits/depressions exceeding 6" Dia.(±) shall be filled w/ quick-set mortar level to deck surface.
3. Serious apparent deck damage shall be reviewed by the Architect for further action.

PART 2 - PRODUCTS AND EXECUTION

A. Fasteners

1. Fasteners shall be aluminum or stainless steel.
2. Refer to Detail Drawings for specific type, location, pattern and frequency of fasteners.

B. Wood Nailers & Curbs

1. New, permanent nailers and curbs shall be pressure treated lumber.
2. Temporary wood curbs may be of standard lumber (non-PT).
3. Hidden defective wood nailers & curbs shall be repaired/replaced with like size as Unit Extras.

C. Insulation

1. Insulation shall be Iso-Board as approved by the membrane manufacturer to qualifying the system for the U.L. Class A Fire Rating as listed with the Underwriters Laboratories.
2. Ref: Detail Drawings No's. 6.0 thru 10.0.

D. Flashing Membrane

1. New flashing membrane is now in place on the Machine Room (Roof Area D) and 4 Mechanical Unit curbs (Roof Areas B & E). Ref: §5.02 for description of material.
2. Flashing membrane shall continue to be 45 mil, Smooth "Fibertite" as manufactured by Seaman Corp., maintaining the Manufacturer's 20 year (N.D.L.) warrantee.
3. Refer to: Roof Plans No's. 1.0A (Phase 1, B North) & 1.4; Detail Drawings No's. 6.0 & 7.0: Parapet & old parapet flashing remain in place. (New coping stone by others.)
 - a) Install new plywood facing over old flashing material on inside of parapet per Detail Drawing No. 6.0.

- b) Proceed with Spec § 5.07 thru 5.11.
4. New parapet wall masonry shall cure for one week prior to installation of new flashing membrane. Ref: Detail Drawings No's. 8 thru 10.
 5. All flashing area masonry surfaces shall receive a thin coat of PVA (poly-vinyl acetate) primer, allowed to cure 24 hours.
 6. Install membrane with No. 190 adhesive to both surfaces (membrane & parapet) in a manner to minimize laps bucking water flow to drain.
 7. Membrane field seams shall lap 4" minimum, staggering factory seams.
 8. Heat weld [hot air] all membrane field seams solid, excluding all voids.
 9. Install membrane waterproof cutoffs at the end of each days work per attached Detail Drawing No. 3.0.
 10. Specified manufacturer's instructions & application manual are incorporated as part of these documents. Submittal required for approval.

END OF SECTION 07 5020

SECTION 07 6200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Manufactured Products:
 - a. Manufactured through-wall flashing and counterflashing.
 - b. Manufactured reglets and counterflashing.
 - c. Window sill pans

1.3 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Thermal Movements: Provide sheet metal flashing and trim that allows for thermal movements from ambient and surface temperature changes.
 - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
 - 1. Identification of material, thickness, weight, and finish for each item and location in Project.
 - 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 - 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 - 4. Details of termination points and assemblies, including fixed points.

5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
7. Details of special conditions.
8. Details of connections to adjoining work.
9. Detail formed flashing and trim at a scale of not less than 1-1/2 inches per 12 inches.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
- B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

PART 2 - PRODUCTS

2.1 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, dead soft, fully annealed.
 1. Finish: 2D (dull, cold rolled).
 2. Surface: Smooth, flat.
- C. Aluminum Sheet: ASTM B 209, alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
 1. Surface: Smooth, flat.
 2. Exposed Coil-Coated Finishes:
 - a. Two-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare,

pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

3. Color: White..
4. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.

2.2 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal[**or manufactured item**].
 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
 - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
 - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
 2. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.
- C. Solder:
 1. For Stainless Steel: ASTM B 32, Grade Sn60, with an acid flux of type recommended by stainless-steel sheet manufacturer.
- D. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch wide and 1/8 inch thick.
- E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.3 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Through-Wall Ribbed Sheet Metal Flashing: Manufacture through-wall sheet metal flashing for embedment in masonry with ribs at 3-inch intervals along length of flashing to provide an integral mortar bond. Manufacture through-wall flashing with snaplock receiver on exterior face to receive counterflashing.
1. Stainless Steel: 0.016 inch thick.
 - a. Products: Subject to compliance with requirements, provide one of the following:
 - 1) Cheney Flashing Company; Cheney Flashing (Sawtooth).
 - 2) Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
 - 3) Keystone Flashing Company, Inc.; Keystone Three-Way Interlocking Thruwall Flashing.
 - 4) Sandell Manufacturing Company, Inc.; Pre-Formed Metal Flashing.
- B. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cheney Flashing Company.
 - b. Fry Reglet Corporation.
 - c. Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
 - d. Keystone Flashing Company, Inc.
 2. Material: Stainless steel, 0.019 inch thick.
 3. Masonry Type: Provide with offset top flange for embedment in masonry mortar joint.
 4. Accessories:
 - a. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where Drawings show reglet without metal counterflashing.
 - b. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.
 5. Finish: Mill

2.4 WINDOW SILL ASSEMBLY

- A. Provide 0.040 prefinished lum sill assemblies, Concealed cornes may be welded or sealed with putyl tape and stainless steel rivits..

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.

1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 2. Obtain field measurements for accurate fit before shop fabrication.
 3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- E. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- G. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- I. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.
- J. Do not use graphite pencils to mark metal surfaces.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.

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

3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 3. Space cleats not more than 12 inches apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
 5. Install sealant tape where indicated.
 6. Torch cutting of sheet metal flashing and trim is not permitted.
 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Coat back side of stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
- D. Seal joints as shown and as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F.
 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."
- E. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches, except reduce pre-tinning where pre-tinned surface would show in completed Work.

1. Do not use torches for soldering. Heat surfaces to receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.
2. Stainless-Steel Soldering: Tin edges of uncoated sheets using solder recommended for stainless steel and acid flux. Promptly remove acid flux residue from metal after tinning and soldering. Comply with solder manufacturer's recommended methods for cleaning and neutralization.

3.3 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.
- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.4 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 07 6200

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SECTION 07 9200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Silicone joint sealants.

1.3 PRECONSTRUCTION TESTING

- A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
 - 1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
 - 2. Submit not fewer than eight pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
 - 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 - 4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
 - 5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- wide joints formed between two 6-inch- long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.

- B. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
 - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
 - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- C. Warranties: Sample of special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

1.7 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.8 WARRANTY

- A. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
 - 1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
 - 2. Disintegration of joint substrates from natural causes exceeding design specifications.
 - 3. Mechanical damage caused by individuals, tools, or other outside agents.
 - 4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and

application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

- B. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
 - 1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- C. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- E. Colors of Exposed Joint Sealants: Match Architect's samples.

2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Dow Corning Corporation; 790.
 - b. Pecora Corporation; 301 NS.
 - c. Sika Corporation, Construction Products Division; SikaSil-C990.
 - d. Tremco Incorporated; Spectrem 1.

2.3 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer for all joints..
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
 - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
- B. Joint Priming: Prime joint substrates . Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.
 - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
 - 1. Place sealants so they directly contact and fully wet joint substrates.
 - 2. Completely fill recesses in each joint configuration.
 - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
 - 1. Remove excess sealant from surfaces adjacent to joints.
 - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.

3.4 FIELD QUALITY CONTROL

- A. Evaluation of Field-Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

END OF SECTION 07 9200

SECTION 08589 HURRICANE RESISTANT WINDOWS AND DOORS

PART 1 GENERAL

1 RELATED DOCUMENTS

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

1.1 SECTION INCLUDES

Impact-resistant aluminum windows, including aluminum extrusions, finish, glass, louvers, internal sealants and weather stripping, for high velocity hurricane zone (HVHZ) construction.

1.2 REFERENCES

- A. American Architectural Manufacturers Association:
 - 1. AAMA 701/702: Pile weatherstripping and replaceable weatherseals.
 - 2. AAMA 2603: Organic coatings on aluminum.
 - 3. AAMA 2605: High-performance organic coatings on aluminum.
- B. American Society of Civil Engineers
 - 1. ASCE 7: Minimum Design Loads for Buildings and other Structures.
- C. American Society for Testing and Materials:
 - 1. ASTM B 221: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 2. ASTM E 283: Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - 3. ASTM E 330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - 4. ASTM E 331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- D. Florida Building Code - Building, 2007 (FBC):
 - 1. Sections governing construction in a high-velocity wind zone (HVWZ).
 - a. FBC 1620: HVWZ Wind Loads (Structural).
 - b. FBC 2410: HVWZ General (Glass and Glazing).
 - c. FBC 2411: HVWZ Windows, Doors, Glass and Glazing.
 - 2. Miami Dade County Test Application Standards (TAS) adopted by FBC:
 - a. TAS 201-95.1: Impact Test Procedures.
 - b. TAS 202-95.1: Criteria for Testing Impact Resistant Building Envelope Components (Uniform Static Air Pressure Method).
 - c. TAS 203-95.1: Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.

1.3 PERFORMANCE REQUIREMENTS

- A. Impact-Resistant Aluminum Window and Door Performance:
 - 1. Structural Test - ASTM E 330.
 - 2. Water infiltration resistance. ASTM ES47/E 331 and FBC TAS 202.
 - 3. Air infiltration resistance, ASTM E 283.
 - 4. Windborne debris impact resistance: Pass large missile impact tests; Florida Building Code, FBC TAS 201.

5. Hurricane wind pressure resistance. After passing large missile impact test, pass cyclic pressure tests following FBC TAS 203.

1.4 SUBMITTALS

- A. Shop Drawings: Refer to Section 01300 for complete submittal procedures. Indicate elevations, locations, markings, quantities, material, head jamb and sill conditions, metal thickness, sizes, shapes, dimensions, finishes and wind pressures.
- B. Product Data: Provide detailed data on Manufacturers catalog data on each product to be used, including Miami Dade County Product Approval (NOA) and Florida Building Code (FBC) HVHZ Product Approval.
- C. Selection Samples: For each finish specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Not less than 10 years of experience in manufacturing impact-resistant aluminum windows and doors.
- B. Installer Qualifications: Skilled and experienced to install manufacturer's units of the types specified.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging in a clean, dry area until ready for installation.
- B. Protect exposed metal and glass surfaces to prevent damage to finish.

1.7 WARRANTIES

- A. Warranty Period:
 1. Finishes - 10 years.
 2. Stress cracks on glass - 1 year.
 3. Delamination on laminated glass units- 5 years.
 4. Insulated Glass (sealed component) - 10 years.

PART 2 PRODUCTS

2.1 ALUMINUM WINDOWS

- A. Fixed Windows:
 1. Rectangular Fixed Windows - Example Sizes and Related Design Pressures:
 - a. Unit Size: 24 by 54 inches, 110 psf Positive, 195 psf Negative.
 - b. Unit Size: 37 by 63 inches, 102.1 psf Positive, 111.3 psf Negative.
 - c. Unit Size: 48 by 72 inches, 90 psf Positive, 90 psf Negative.
 2. Air Infiltration Resistance: Air leakage no more than 0.07 cfm/sqft of glass area at pressure differential of 6.24 psf (air infiltration tests conducted at pressure differential of 1.57 psf may not be used to justify compliance).
 3. Water Infiltration Resistance: No water penetration at a static air pressure differential of 15 percent of positive design pressure with a maximum tested performance of 16.5 psf.
 4. Construction: Heavy extruded aluminum-alloy sections, precision cut and assembled

with sealed, mitered, hairline joints.

5. Member Wall Thicknesses: Rectangular window fixed frames: At least 0.080 inch (2.03 mm). Rectangular window vents: At least 0.090 inch (2.29 mm).
6. Frame Depth: Rectangular fixed windows frames: At least 2.075 inches (53 mm). Provide 0.50 (12.7 mm) inch flanges at perimeter frames.
7. Sightlines:
 - a. Rectangular fixed: Jamb, sill and head - 3.5 inches (89 mm)
8. Corner Construction at Rectangular Fixed Window Frames: Assemble with sealed, mitered, hairline joints, made rigid by fastening with No. 10 stainless steel screws. At fixed window frames: 4 stainless steel corner keys and 4 aluminum corner keys.
9. Glazing beads: Rectangular fixed - extruded aluminum snap-in design, with 0.500 inch (12.7 mm) glass bite for impact-resistant glazing at rectangular fixed windows. OG profile.
10. Finish: Uniform at all visible surface exterior and interior, vents open or shut, as specified.
11. Glass: As specified, factory glazed.
 - a. Insulated Laminated Impact Resistant Glass Unit: 3/4 inch (19 mm) thick (nominal) consisting of a sacrificial exterior light and a clear, non-yellowish, non-crazing interlayer sandwiched between two panes of glass.
 - 1) Exterior sacrificial light/pane: 1/8 Inch (3.2mm) tempered.
 - a) Tint in Outer Pane: None - gray
 - 2) Airspace - 1/4 inch (6 mm) minimum air space.
 - 3) Low E and high performance glass coatings as specified.
 - 4) Laminated Unit:
 - a) Consisting of clear, non-yellowish, non-crazing interlayer sandwiched between two panes of glass.
 - b) Outer and Inner Panes of Laminated Unit: 1/8 inch (3.2mm), using either annealed or tempered glass (when required by loads).
 - c) Tint:
 - 1) Clear, Low E.
12. Standards: Miami Dade County NOA (Notices of Acceptance).
13. Aluminum alloy and temper: AA 6063-T5 and T6 temper.
14. Louvers shall match windows and shall maintain hurricane rating.
15. Sealant for installing windows and blocking shall be butyl.

16. Project-Out / Awning Windows:

17. Example Sizes and Related Design Pressures. Refer to product approvals for latest results:
 - a. Unit Size: 24 by 54 inches, 110 psf positive, 195 psf Negative.
18. Air Infiltration Resistance: Air leakage no more than 0.04 cfm/sqft of glass area at pressure differential of 6.24 psf (air infiltration tests conducted at pressure differential of 1.57 psf may not be used to justify compliance).
19. Water Infiltration Resistance: No water penetration at a static air pressure differential of 15 percent of positive design pressure with a maximum tested performance of 16.5 psf.
20. Construction: Heavy extruded aluminum-alloy sections, precision cut and assembled with hairline joints and no visible fasteners when vents are closed. Provide grooves in extrusions to receive double weather stripping between vents and frames. Swing casement and project-out vents outward.
21. Member Wall Thicknesses: Frames: At least 0.080 inch (2.03 mm). Vents: At least 0.090 inch (2.29 mm).
22. Frame Depth: At least 2.075 inches (53 mm). Provide 0.50 (12.7 mm) inch flanges at perimeter frames.
23. Sightlines: Jamb, sill and head - 3.5 inches (89 mm) from tip of flange to glass.
24. Corner Construction at Casement and Project-Out Window Frames and Vents:

Assemble with sealed hairline joints, made rigid by fastening with No. 10 stainless steel screws and the following. At frames: 4 stainless steel corner keys and 4 aluminum corner keys. At vents: 4 stainless steel corner keys.

25. Glazing beads: Extruded aluminum snap-in design, with 0.500 inch (12.7 mm) glass bite for impact-resistant glazing. OG profile
26. Weatherstripping: Dual continuous rows of weatherstripping.
27. Finish: Uniform at all visible surface exterior and interior, vents open or shut, as specified.
28. Glass: As specified, factory glazed.
 - a. Insulated laminated impact resistant glass unit - 3/4 inch (19 mm) thick (nominal) consisting of a sacrificial exterior light and a clear, non-yellowish, non-crazing interlayer sandwiched between two panes of glass.
 - 1) Exterior sacrificial light/pane - 1/8 Inch (3.2mm) tempered.
 - a) Tint in Outer Pane: Gray.
 - 2) Airspace: 1/4 inch (6 mm) minimum air space.
 - 3) Low E and high performance glass coatings as specified.
 - 4) Laminated Unit:
 - a) Consisting of clear, non-yellowish, non-crazing interlayer sandwiched between two panes of glass.
 - b) Outer and inner panes of laminated unit - 1/8 inch (3.2mm), using either annealed or tempered glass (when required by loads).
 - c) Tint:
 - 1) Clear, Low E.
29. Window Options:
 - a. Screens at interior of all vents. Charcoal fiberglass insect screen fabric, tightly splined into inconspicuous extruded aluminum-alloy frames with rigid corner construction.
 - b. Ogee glazing bead profile (colonial).
 - c. Folding crank handles.
30. Standards: Miami Dade County NOA (Notices of Acceptance).
31. Aluminum Alloy and Temper: AA 6063-T5 and T6 temper
32. Sealant for installinf window and blocking Butyl..
33. Hardware: As specified, factory applied and field adjusted.
 - a. Operator: Dual-arm rotary operator with crank handle, running in stainless steel operator track. Provide snubber blocks.
 - b. Hinges: Pair of stainless steel 4-bar concealed hinges.
 - c. Sash locks, with Keepers: Two cam locks with lever handle. Provide one 1/8 inch (3.2 mm) thick stainless steel keeper at each cam lock.
 - d. Hardware Color: Salt-air resistant multi-coat baked enamel in metallic finish.
 - 1) Color: White.
 - e. Operator finish E-Gard Finish.
 - f. Hardware Options:
 - 1) Short arm operator providing approximately 4 inches (102 mm) of ventilation area.

2.2 FINISH

- A. AAMA 2605 Kynar (or comparable) finish - pretreatment plus 2 coat, 70 percent polyvinylidene fluoride (PVDF) coating. Color as selected by Architect. (White)

PART 3 EXECUTION

3.1 PREPARATION

- A. Before start of unit installation, check openings for adequacy of pressure preservative treated wood blocking that will receive frames. Check the size, quantity, spacing, clearances,

and rigidity of fastenings and their conformance to the specified NOA.

3.2 PREPARATION

- A. Coordinate with Section 06100 - Wood blocking and fasteners to structure:
 - 1. 3/4 inch (19 mm) or 1-1/2 inch (38.1 mm) as per specified NOA rectangular or beveled pressure preservative treated South Yellow Pine blocking, set in a full bed of sealant.
 - 2. Fasten with to structure with drilled concrete fasteners spaced as required in NOA, so that blocking is continuous and is tightly butted to fill corners of each opening.
- B. Coordinate with Section 07920 - Exterior and interior sealants at unit perimeters:
 - 1. Sealant at exterior perimeter of aluminum frames, in deeply grooved stucco or in 1/4 inch (6 mm) gaps where other exterior finish materials terminate next to frames.
 - 2. Sealant in 1/8 inch (3.2 mm) gap at frame interior perimeters where sills and interior finish materials such as gypsum board and tile terminate next to frames.
- C. Perform cutting, fitting, forming, drilling, and grinding of frames, without damage to finish, as needed to fit project conditions and make watertight. Replace components with damage to exposed finishes.

3.3 WINDOW INSTALLATION

- A. Install windows following manufacturer's instructions.
- B. Attach window frame and shims to perimeter blocking at openings to accommodate construction tolerances and other irregularities. Maintain integrity of air barriers and vapor retarder sheets.
- C. Align windows plumb and level, free of warp or twist.
- D. Installation shall be in accordance with NOA..

3.4 CLEANING

- A. Refer to manufacturers instructions for proper cleaning and maintenance of the products.

END OF SECTION 08 5890

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Jerry N Zoller, AIA, PA

SECTION 08589 HURRICANE RESISTANT WINDOWS AND DOORS

PART 1 GENERAL

1 RELATED DOCUMENTS

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

1.1 SECTION INCLUDES

Impact-resistant aluminum windows, including aluminum extrusions, finish, glass, louvers, internal sealants and weather stripping, for high velocity hurricane zone (HVHZ) construction.

1.2 REFERENCES

- A. American Architectural Manufacturers Association:
 - 1. AAMA 701/702: Pile weatherstripping and replaceable weatherseals.
 - 2. AAMA 2603: Organic coatings on aluminum.
 - 3. AAMA 2605: High-performance organic coatings on aluminum.
- B. American Society of Civil Engineers
 - 1. ASCE 7: Minimum Design Loads for Buildings and other Structures.
- C. American Society for Testing and Materials:
 - 1. ASTM B 221: Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
 - 2. ASTM E 283: Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
 - 3. ASTM E 330: Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference.
 - 4. ASTM E 331: Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- D. Florida Building Code - Building, 2007 (FBC):
 - 1. Sections governing construction in a high-velocity wind zone (HVWZ).
 - a. FBC 1620: HVWZ Wind Loads (Structural).
 - b. FBC 2410: HVWZ General (Glass and Glazing).
 - c. FBC 2411: HVWZ Windows, Doors, Glass and Glazing.
 - 2. Miami Dade County Test Application Standards (TAS) adopted by FBC:
 - a. TAS 201-95.1: Impact Test Procedures.
 - b. TAS 202-95.1: Criteria for Testing Impact Resistant Building Envelope Components (Uniform Static Air Pressure Method).
 - c. TAS 203-95.1: Criteria for Testing Products Subject to Cyclic Wind Pressure Loading.

1.3 PERFORMANCE REQUIREMENTS

- A. Impact-Resistant Aluminum Window and Door Performance:
 - 1. Structural Test - ASTM E 330.
 - 2. Water infiltration resistance. ASTM ES47/E 331 and FBC TAS 202.
 - 3. Air infiltration resistance, ASTM E 283.
 - 4. Windborne debris impact resistance: Pass large missile impact tests; Florida Building Code, FBC TAS 201.
 - 5. Hurricane wind pressure resistance. After passing large missile impact test, pass cyclic pressure tests following FBC TAS 203.

1.4 SUBMITTALS

- A. Shop Drawings: Refer to Section 01300 for complete submittal procedures. Indicate elevations, locations, markings, quantities, material, head jamb and sill conditions, metal thickness, sizes, shapes, dimensions, finishes and wind pressures.
- B. Product Data: Provide detailed data on Manufacturers catalog data on each product to be used, including Miami Dade County Product Approval (NOA) and Florida Building Code (FBC) HVHZ Product Approval.
- C. Selection Samples: For each finish specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.

1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Not less than 10 years of experience in manufacturing impact-resistant aluminum windows and doors.
- B. Installer Qualifications: Skilled and experienced to install manufacturer's units of the types specified.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging in a clean, dry area until ready for installation.
- B. Protect exposed metal and glass surfaces to prevent damage to finish.

1.7 WARRANTIES

- A. Warranty Period:
 - 1. Finishes - 10 years.
 - 2. Stress cracks on glass - 1 year.
 - 3. Delamination on laminated glass units- 5 years.
 - 4. Insulated Glass (sealed component) - 10 years.

PART 2 PRODUCTS

2.1 ALUMINUM WINDOWS

A. Fixed Windows:

1. Rectangular Fixed Windows - Example Sizes and Related Design Pressures:
 - a. Unit Size: 24 by 54 inches, 110 psf Positive, 195 psf Negative.
 - b. Unit Size: 37 by 63 inches, 102.1 psf Positive, 111.3 psf Negative.
 - c. Unit Size: 48 by 72 inches, 90 psf Positive, 90 psf Negative.
2. Air Infiltration Resistance: Air leakage no more than 0.07 cfm/sqft of glass area at pressure differential of 6.24 psf (air infiltration tests conducted at pressure differential of 1.57 psf may not be used to justify compliance).
3. Water Infiltration Resistance: No water penetration at a static air pressure differential of 15 percent of positive design pressure with a maximum tested performance of 16.5 psf.
4. Construction: Heavy extruded aluminum-alloy sections, precision cut and assembled with sealed, mitered, hairline joints.
5. Member Wall Thicknesses: Rectangular window fixed frames: At least 0.080 inch (2.03 mm). Rectangular window vents: At least 0.090 inch (2.29 mm).
6. Frame Depth: Rectangular fixed windows frames: At least 2.075 inches (53 mm). Provide 0.50 (12.7 mm) inch flanges at perimeter frames.
7. Sightlines:
 - a. Rectangular fixed: Jambs, sill and head - 3.5 inches (89 mm)
8. Corner Construction at Rectangular Fixed Window Frames: Assemble with sealed, mitered, hairline joints, made rigid by fastening with No. 10 stainless steel screws. At fixed window frames: 4 stainless steel corner keys and 4 aluminum corner keys.
9. Glazing beads: Rectangular fixed - extruded aluminum snap-in design, with 0.500 inch (12.7 mm) glass bite for impact-resistant glazing at rectangular fixed windows. OG profile.
10. Finish: Uniform at all visible surface exterior and interior, vents open or shut, as specified.
11. Glass: As specified, factory glazed.
 - a. Insulated Laminated Impact Resistant Glass Unit: 3/4 inch (19 mm) thick (nominal) consisting of a sacrificial exterior light and a clear, non-yellowish, non-crazing interlayer sandwiched between two panes of glass.
 - 1) Exterior sacrificial light/pane: 1/8 Inch (3.2mm) tempered.
 - a) Tint in Outer Pane: None - gray
 - 2) Airspace - 1/4 inch (6 mm) minimum air space.
 - 3) Low E and high performance glass coatings as specified.
 - 4) Laminated Unit:
 - a) Consisting of clear, non-yellowish, non-crazing interlayer sandwiched between two panes of glass.
 - b) Outer and Inner Panes of Laminated Unit: 1/8 inch (3.2mm), using either annealed or tempered glass (when required by loads).
 - c) Tint:
 - 1) Clear, Low E.

12. Standards: Miami Dade County NOA (Notices of Acceptance).
 13. Aluminum alloy and temper: AA 6063-T5 and T6 temper.
 14. Louvers shall match windows and shall maintain hurricane rating.
 15. Sealant for installing windows and blocking shall be butyl.
16. Project-Out / Awning Windows:
17. Example Sizes and Related Design Pressures. Refer to product approvals for latest results:
 - a. Unit Size: 24 by 54 inches, 110 psf positive, 195 psf Negative.
 18. Air Infiltration Resistance: Air leakage no more than 0.04 cfm/sqft of glass area at pressure differential of 6.24 psf (air infiltration tests conducted at pressure differential of 1.57 psf may not be used to justify compliance).
 19. Water Infiltration Resistance: No water penetration at a static air pressure differential of 15 percent of positive design pressure with a maximum tested performance of 16.5 psf.
 20. Construction: Heavy extruded aluminum-alloy sections, precision cut and assembled with hairline joints and no visible fasteners when vents are closed. Provide grooves in extrusions to receive double weather stripping between vents and frames. Swing casement and project-out vents outward.
 21. Member Wall Thicknesses: Frames: At least 0.080 inch (2.03 mm). Vents: At least 0.090 inch (2.29 mm).
 22. Frame Depth: At least 2.075 inches (53 mm). Provide 0.50 (12.7 mm) inch flanges at perimeter frames.
 23. Sightlines: Jambs, sill and head - 3.5 inches (89 mm) from tip of flange to glass.
 24. Corner Construction at Casement and Project-Out Window Frames and Vents: Assemble with sealed hairline joints, made rigid by fastening with No. 10 stainless steel screws and the following. At frames: 4 stainless steel corner keys and 4 aluminum corner keys. At vents: 4 stainless steel corner keys.
 25. Glazing beads: Extruded aluminum snap-in design, with 0.500 inch (12.7 mm) glass bite for impact-resistant glazing. OG profile
 26. Weatherstripping: Dual continuous rows of weatherstripping.
 27. Finish: Uniform at all visible surface exterior and interior, vents open or shut, as specified.
 28. Glass: As specified, factory glazed.
 - a. Insulated laminated impact resistant glass unit - 3/4 inch (19 mm) thick (nominal) consisting of a sacrificial exterior light and a clear, non-yellowish, non-crazing interlayer sandwiched between two panes of glass.
 - 1) Exterior sacrificial light/pane - 1/8 Inch (3.2mm) tempered.
 - a) Tint in Outer Pane: Gray.
 - 2) Airspace: 1/4 inch (6 mm) minimum air space.
 - 3) Low E and high performance glass coatings as specified.
 - 4) Laminated Unit:
 - a) Consisting of clear, non-yellowish, non-crazing interlayer sandwiched between two panes of glass.

- b) Outer and inner panes of laminated unit - 1/8 inch (3.2mm), using either annealed or tempered glass (when required by loads).
 - c) Tint:
 - 1) Clear, Low E.
29. Window Options:
- a. Screens at interior of all vents. Charcoal fiberglass insect screen fabric, tightly splined into inconspicuous extruded aluminum-alloy frames with rigid corner construction.
 - b. Ogee glazing bead profile (colonial).
 - c. Folding crank handles.
30. Standards: Miami Dade County NOA (Notices of Acceptance).
31. Aluminum Alloy and Temper: AA 6063-T5 and T6 temper
32. Sealant for install in window and blocking Butyl.
33. Hardware: As specified, factory applied and field adjusted.
- a. Operator: Dual-arm rotary operator with crank handle, running in stainless steel operator track. Provide snubber blocks.
 - b. Hinges: Pair of stainless steel 4-bar concealed hinges.
 - c. Sash locks, with Keepers: Two cam locks with lever handle. Provide one 1/8 inch (3.2 mm) thick stainless steel keeper at each cam lock.
 - d. Hardware Color: Salt-air resistant multi-coat baked enamel in metallic finish.
 - 1) Color: White.
 - e. Operator finish E-Gard Finish.
 - f. Hardware Options:
 - 1) Short arm operator providing approximately 4 inches (102 mm) of ventilation area.

2.2 FINISH

- A. AAMA 2605 Kynar (or comparable) finish - pretreatment plus 2 coat, 70 percent polyvinylidene fluoride (PVDF) coating. Color as selected by Architect. (White)

PART 3 EXECUTION

3.1 PREPARATION

- A. Before start of unit installation, check openings for adequacy of pressure preservative treated wood blocking that will receive frames. Check the size, quantity, spacing, clearances, and rigidity of fastenings and their conformance to the specified NOA.

3.2 PREPARATION

- A. Coordinate with Section 06100 - Wood blocking and fasteners to structure:
 - 1. 3/4 inch (19 mm) or 1-1/2 inch (38.1 mm) as per specified NOA rectangular or beveled pressure preservative treated South Yellow Pine blocking, set in a full

bed of sealant.

2. Fasten with to structure with drilled concrete fasteners spaced as required in NOA, so that blocking is continuous and is tightly butted to fill corners of each opening.
- B. Coordinate with Section 07920 - Exterior and interior sealants at unit perimeters:
1. Sealant at exterior perimeter of aluminum frames, in deeply grooved stucco or in 1/4 inch (6 mm) gaps where other exterior finish materials terminate next to frames.
 2. Sealant in 1/8 inch (3.2 mm) gap at frame interior perimeters where sills and interior finish materials such as gypsum board and tile terminate next to frames.
- C. Perform cutting, fitting, forming, drilling, and grinding of frames, without damage to finish, as needed to fit project conditions and make watertight. Replace components with damage to exposed finishes.

3.3 WINDOW INSTALLATION

- A. Install windows following manufacturer's instructions.
- B. Attach window frame and shims to perimeter blocking at openings to accommodate construction tolerances and other irregularities. Maintain integrity of air barriers and vapor retarder sheets.
- C. Align windows plumb and level, free of warp or twist.
- D. Installation shall be in accordance with NOA..

3.4 CLEANING

- A. Refer to manufacturers instructions for proper cleaning and maintenance of the products.

END OF SECTION 08 5890

SECTION 099110 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and the application of paint systems on the following substrates:
 - 1. Fiberglass reinforced concrete.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
 - 1. Maintain containers in clean condition, free of foreign materials and residue.
 - 2. Remove rags and waste from storage areas daily.

1.5 PROJECT CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Benjamin Moore & Co.
 - 2. Sherwin-Williams Company (The).

2.2 PAINT, GENERAL

- A. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

B. Colors: As indicated in a color schedule.

2.3 EXTERIOR CEMENTITIOUS MATERIALS

A. Clear sealer:

1. 1 coat: S-W Loxon 40% Silane Low VOC Vertical Water Repellant

B. Painted surfaces:

1. 1st Coat: S-W Loxon® Exterior Acrylic Masonry Primer, A24W300 (8 mils wet, 3.2 mils dry)
2. 2nd Coat: S-W Loxon XP® Waterproofing Masonry Coating (14 mils wet, 6.4 mils dry per coat)

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Concrete: 12 percent.
- C. Begin coating application only after unsatisfactory conditions have been corrected and surfaces are dry.
 1. Beginning coating application constitutes Contractor's acceptance of substrates and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual" applicable to substrates indicated.
- B. Clean substrates of substances that could impair bond of paints, including dirt, oil, grease, and incompatible paints and encapsulants.
 1. Remove incompatible primers and reprime substrate with compatible primers as required to produce paint systems indicated.
- C. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions.
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure at any time and as often as Owner deems necessary during the period when paints are being applied:
 - 1. Owner will engage the services of a qualified testing agency to sample paint materials being used. Samples of material delivered to Project site will be taken, identified, sealed, and certified in presence of Contractor.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying-paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

3.5 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

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- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

END OF SECTION 09 9100

SECTION 16 601 LIGHTNING PROTECTION SYSTEMS

PART 1 - GENERAL

Listing of components, inspection and certification of installations: Applied Research Laboratories, Inc., an independent, nationally recognized testing laboratory, shall list the components, inspect and certify the installation of Heary Bros. Lightning Protection and Lightning Preventor of America's ESE lightning protection systems for compliance with Manufacturer's Installation Standard HBP-21.

1.1 SUMMARY

Provide all labor, components, equipment, and services to perform all operations required for the complete installation and related work as specified herein. Any such work in any other section of these specifications that is not specifically described therein shall comply with the requirements of this section. The following items of work are specifically included in, but not necessarily limited to, the work of this section without limiting the generality implied by these specifications:

- A. 1. ESE lightning protection air terminal
- B. 2. Mast, complete with base and supports
- C. 3. Down conductors
- D. 4. Grounds
- E. 5. Transient Voltage Surge Suppression

1.2 SUBMITTALS

- A. The ESE installer shall provide ten (10) complete sets of shop drawings for review, showing location of ESE air terminal, mast conductors, installation procedures and details.
- B. Detailed manufacturer's data sheets on all components, accessories and miscellaneous equipment shall also be submitted.

1.3 DESCRIPTION OF SYSTEM

- A. The ESE installer shall provide a complete installation of equipment to comprise a complete system in accordance with Manufacturer's Installation Standard HBP-21.
- B. The ESE installer shall be responsible for all components and labor to accomplish this result.
- C. The system, including the ESE air terminal, conductors, mast and complementary parts, shall be installed so that completed work is unobtrusive and does not detract from the building appearance.

1.4 CODES, REGULATIONS, PERMITS

- A. The completed system shall comply with the ESE manufacturer's standard, equipment supplier drawings and specification requirements for installation of ESE lightning protection systems.
- B. The installer, at his expense, shall accomplish any corrections required by the inspection.
- C. Noncompliance shall be reported to the equipment supplier for consideration.

1.5 STANDARDS OF QUALITY

- A. The ESE system equipment supplier, contractor, and installer shall install the ESE system in compliance with the Manufacturer's Installation Standard HBP-21.
- B. The ESE system and manufacturer's guarantees and warranties shall be submitted to the owner upon completion of the ESE system installation.

1.6 SERVICE AND INSPECTION

- A. Installation of equipment shall be reviewed by the manufacturer, and shall be in accordance with the manufacturer's requirements. The installation shall be inspected by Applied Research Laboratories, Inc. for compliance with Manufacturer's Installation Standard HBP-21.
- B. The lightning protection installing contractor shall provide a videotape of the installation, including but not limited to; mast mounting, bonding connections (waterline & structural steel), down conductors, ground rods/grids and all buried, concealed or inaccessible connections and components.
- C. This information shall be forwarded to the ESE manufacturer for evaluation, certification, archiving and documentation.
- D. The Manufacturer shall forward the videotape to Applied Research Laboratories, Inc. for inspection and certification.
- E. The ground resistance of the completed system shall be measured using IEEE "Fall of Potential Method" in the presence of the Architect/Engineer and shall be forwarded to the ESE manufacturer.
- F. Ground resistance shall be ten (10) ohms or less.
- G. Listing of components and certification of installation: Applied Research Laboratories; shall list the components, inspect and certify the installation of Heary Bros. Lightning Protection and Lightning Preventor of America's ESE lightning protections systems for compliance with Manufacturer's Installation Standard HBP-21.

PART 2 - PRODUCTS

2.1 ESE AIR TERMINAL

- A. The complete assembly shall consist of a 5/8" air terminal, which is HD 29 CU, and heavy chrome plated 24 CH. Lock nut and washer shall be chrome plated copper. Support structure shall be chrome plated soft copper. Sphere shall be threaded to the air terminal.
- B. The base of the ESE air terminal shall be threaded for interconnection to top of mast.

2.2 CONDUCTORS

- A. Copper conductors shall be 28 strands of 14-gauge wire rope lay, with a net weight of 375 pounds per 1,000 feet (60mm²), minimum.
- B. The structural steel may be utilized as the main conductor provided the steel is electrically continuous or is made so via other means.
- C. Every other column or an average of 60'-0" (18m) intervals shall be bonded and connected to the ground system.
- D. All conductors shall be secured every 3'-0" (900mm) maximum.
- E. Fasteners and clips utilized shall be of equal corrosion resistance as the components being secured.
- F. Bonding of all conductive material within 6'-0" (1800mm) of the conductor shall be accomplished via secondary conductor no smaller than #6 (14mm²) copper.
- G. Bare copper components shall not be installed on dissimilar metals. Corrosion resistant copper equipment shall be utilized where these conditions exist.
- H. Corrosion resistant copper conductors and fittings shall be utilized where corrosive atmospheres are present.
- I. Conductors shall be installed so that a conductor shall always have a horizontal or downward path, free of "U" and "V" pockets, with the exception that an 8" (203mm) maximum rise, or a rise of 3" (80mm) maximum for every 12" (300mm) of conductor length shall be permitted in a main conductor run.
- J. Each ESE terminal shall have two (2) paths to ground from the base plate of the mast, with the exception of an elevated mast that may have a single conductor run for a maximum of 16'-0" (4880mm) before two (2) down conductors shall be initiated.
- K. The electrical contractor shall furnish and install all necessary PVC conduit for concealed down conductors.

- L. No bend of a conductor shall be less than 90° and shall not have a radius of bend of less than 8" (203mm). Exceptions are through roof and wall assemblies and "T" connections.

2.3 MAST

- A. Aluminum or stainless steel mast with threaded connection for the ESE air terminal and bonding plate for cable connection. Wind and safety factors shall be documented for the geographic area of installation, to determine the size and structure of mast.
- B. Base support, depending upon application, flat mounting base, side mounting base and/or structural support, and/or flagpole may be utilized.

2.4 GROUNDING SYSTEM

- A. Ground rods shall be copperbond 3/4" x 10'-0", minimum.
- B. One set of tripod grounds shall be installed for each down conductor. Refer to paragraph 2.02 B, for structural steel used as down conductors.
- C. Ground plates of high conductivity copper sheet, 20 gauge minimum, 18 in. sq., may be used in lieu of, or in combination with ground rods, to achieve the ten (10) ohm resistance grounding system requirement.
- D. The cable attachments to the ground rods must be accomplished via mechanical clamp. Cable attachments to ground plates shall be via copper bond plates of eight 8in² (5161mm²) of contact area.
- E. A ground loop may be substituted for the ground rods or ground plates. The ground loop must be of a main size conductor and shall comply with the ten (10) Ohm resistance requirement of the grounding system.
- F. Ground rods, ground plates, and ground loop conductors shall be installed a minimum of 1ft. (300mm) below grade and a minimum of 2ft. (600mm) away from the foundation.
- G. All grounding locations shall be as evenly spaced around the building perimeter as possible.
- H. A minimum of one (1) inspection well, rated for the traffic of the installation area, shall be installed for each down conductor or two (2) minimum per ground loop.
- I. Bonding of grounded systems shall be via main size conductors. The bonding shall be accomplished to achieve equal potential of all grounds.

2.5 CONNECTORS, FITTINGS, FASTENERS, AND HARDWARE

- A. Provide all connectors, fittings, fasteners, hardware, clamps, guards, lugs, etc., as required to connect, and install all parts of the system.
- B. All equipment shall be fabricated from copper and/or bronze components

2.6 SURGE SUPPRESSION

- A. Provide surge protection on the electrical, telephone, and antenna and TV lead wires.
- B. The surge suppresser for the main electrical panel shall be industrial grade, with replaceable modules, fused, indicator lights.
- C. The electrical surge suppression equipment shall be installed at the main entrance of the electrical system with a disconnecting mechanism.
- D. The surge suppresser shall have the capability of being disconnected without shutting down the electrical system.
- E. Telephone surge suppression shall be to the standards of the telephone system carrier.
- F. The suppresser shall be industrial grade with replaceable modules, and a reaction time of less than one (1) nanosecond.
- G. This surge equipment shall be installed at the main entrance of the telephone system.
- H. Antenna and TV lead wire suppressers shall be industrial grade suitable for the conductor, coax or hard wire. The suppresser shall have a reaction time of less than one (1) nanosecond and shall be installed as close to the antenna or TV camera as possible.

PART 3 - EXECUTION

3.1 3.01 INSTALLATION-GENERAL

- A. Installation shall be accomplished in a professional manner by an installer of verifiable ESE system installations.
- B. All work installed within the building shall be concealed.
- C. All work installed in accessible locations shall be properly guarded and protected.
- D. All components shall be installed in a manner to prevent electrolytic action under presence of moisture.
- E. All roof, wall or other building penetrations shall be made in a manner to prevent the ingress of water or moisture.

- F. Roof penetrations, flashings/pitch pans shall be furnished and installed by the roofing contractor.
- G. PVC conduit shall be provided by the electrical contractor.

PART 4 - ACCEPTABLE MANUFACTURERS AND SUPPLIERS

- 4.1 MANUFACTURER: Heary Bros. Lightning Protection Co., Inc. Tel.: 800-421-6141
FAX: 716-941-3828

END OF SECTION 16 6010