GARY HOUSING AUTHORITY

Carolyn B Mosby
Senior Citizen Building

Façade & Roofing Improvements

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SECTION 01 10 00 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Project information
2. Work covered by Contract Documents
3. Access to site
4. Coordination with occupants
5. Work restrictions.
6. Specification and Drawing conventions
7. Miscellaneous provisions

1.3 PROJECT INFORMATION

A. Project Identification: Caroline B. Mosby Senior Citizen Building Façade and Roofing Improvements

1. Project Location: 650 Jackson Street, Gary IN 46402

B. Owner: Gary Housing Authority, 578 Broadway, Gary IN 46402

C. Architect: Globetrotters Engineering Corporation, 300 South Wacker #400, Chicago IL 60606, 312-922-6400

1.4 WORK COVERED BY CONTRACT DOCUMENTS

A. The Work of Project is defined by the Contract Documents and consists of the following:

1. The existing building consists of eight stories with a steel structure, metal deck and concrete floors, precast concrete panels and masonry exterior walls, and a modified bitumen roof.
2. Exterior work includes:

a. Remove aluminum column covers at joints; replace damaged thermal insulation and gypsum board.
b. Remove existing sealant at windows and install specified sealant.
c. Remove window mullion cover plates and install fluid-applied air/moisture barrier.

d. Prepare and repair cracked and chipped precast concrete panels
e. At precast concrete panel joints, remove existing sealant and backer rods, install specified sealant, backer rod, and pre-compressed expandable polyurethane tape.
f. Remove existing roofing flashing system around the perimeter of the roof at precast concrete panels and masonry, prepare edges and existing remaining modified bitumen roof system and install TPO roofing.
g. Remove two inoperable mechanical make-up air units and supports, flash and provide cover for remaining equipment curbs.
h. Temporarily remove exhaust fans to flash equipment curbs. Re-install fans.
i. Remove existing flashing around elevator penthouse and roof access stairway and install specified flashing.
j. Remove existing vent flashing and provide vent flashing to match existing.
k. Remove existing exit door & frame at south exterior wall, and replace with new, including all associated hardware, masonry repairs, and other work required to integrate the new assembly with the existing building security system(s).

B. Type of Contract:

1. The project will be constructed under a single prime contract.

1.5 ACCESS TO SITE

A. General: Contractor shall have limited use of Project site for construction operations as indicated by requirements of this Section.

B. Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas of the Work indicated.

1. Limits: Confine construction operations to roof and exterior walls.
2. Driveways, Walkways, and Entrances: Keep driveways, parking spaces, and loading areas**,** and entrances serving premises clear and available to Owner, Owner's employees, tenants, and emergency vehicles at all times. Do not use these areas for parking or for storage of materials.

a. Schedule deliveries to minimize the use of driveways and entrances by the construction operations.
b. Schedule deliveries to minimize space and time requirements for the storage of materials and equipment on-site.

C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout the construction period. Repair damage caused by construction operations.

D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout the construction period. Repair damage caused by construction operations.

1.6 COORDINATION WITH OCCUPANTS

A. Full Owner Occupancy: Owner will occupy the site and existing building during the entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner and Tenant usage. Perform the Work so as not to interfere with Owner and Tenant's day-to-day operations. Maintain existing exits unless otherwise indicated.

1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.

B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.

1. The architect will prepare a Certificate of Substantial Completion for each specific portion of the Work that Owner will occupy prior to Owner acceptance of the completed Work.
2. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.7 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
2. In order to avoid damage of the roof and parapet, utilization of 'swing stages' or similar devices will not be allowed in connection with the façade improvements work.

B. On-Site Work Hours: Comply with limits stated in Owner's Invitation for Bids. Furthermore, comply with the following:

1. Weekend Hours: The Municipal Code of Gary, Indiana prohibits the erection (including excavating), demolition, alteration or repair of any building on any Sunday.
2. Early Morning Hours: The Municipal Code of Gary, Indiana prohibits the erection (including excavating), demolition, alteration or repair of any building between the hours of 6:00 p.m. and 7:00 a.m. on any day.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

1. Notify Owner not less than 72 hours in advance of proposed utility interruptions.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Owner not less than 72 hours in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with utility interruptions.

E. Restricted Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

F. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 01 25 00 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for substitutions.

1.3 DEFINITIONS

A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Owner.

1.4 ACTION SUBMITTALS

A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method replacing by substitution. Include Specification Section number and title, and Drawing numbers and titles.

1. Substitution Request Form: Use facsimile of form provided in Project Manual.
2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:

a. Statement indicating why specified product or fabrication or installation method could not be provided, if applicable.
b. Coordination of information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate proposed substitution.
c. Detailed comparison of significant qualities of proposed substitutions with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes, such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.

d. Product Data, including drawings and descriptions of products and fabrication and installation procedures
e. Samples, where applicable or requested
f. Certificates and qualification data, where applicable or requested
g. List of similar installations for completed projects, with project names and addresses as well as names and addresses of architects and owners.
h. Material test reports from a qualified testing agency, indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project.
j. Detailed comparison of Contractor's construction schedule using proposed substitutions with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
k. Cost information, including a proposal of change, if any, in the Contract Sum.
l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents, except as indicated in substitution request, is compatible with related materials and is appropriate for applications indicated.
m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later

    a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work
    b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.5 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

1.6 PROCEDURES

A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

1.7 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but minimum 15 days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
b. Substitution request is fully documented and properly submitted.
c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.
e. Requested substitution is compatible with other portions of the Work.
f. Requested substitution has been coordinated with other portions of the Work.
g. Requested substitution provides specified warranty.
h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 30 days after the Notice of Award. Architect may consider or will reject requests received after that time.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
b. Requested substitution does not require extensive revisions to the Contract Documents.
c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
d. Substitution request is fully documented and properly submitted.
e. Requested substitution will not adversely affect Contractor's construction schedule.
f. Requested substitution has received necessary approvals of authorities having jurisdiction.
g. Requested substitution is compatible with other portions of the Work.
h. Requested substitution has been coordinated with other portions of the Work.
i. Requested substitution provides specified warranty.

j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012500

SUBSTITUTION REQUEST (After Bid)

Substitution Request Number:

Project: Carolyn B Mosby Senior Citizen Building
650 Jefferson Street
Gary IN 46402

To:

From:

Date:

Re:

Specification Number

Specification Title:

Description:

Section:

Page:

Article/Paragraph:

Proposed

Manufacturer:

Address:

Phone:

Trade Name:

Installer:

Address:

Phone:

Differences between proposed substitution and specified product:

Reason for not providing specified item

Proposed substitution affects other parts of Work:	No	Yes; explain	

Savings to Owner for accepting substitution:	$
Substitution changes Contract Time ☐Yes ☐No ☐Add ☐Deduct	days

Support Data Attached: ☐Drawings ☐Product Data ☐Samples ☐Tests Reports
☐Point by point comparative data attached (Required)

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product
- Same warranty will be furnished for proposed substitution as for specified product
- Same maintenance service and source of replacement parts, as applicable, is available

Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule

- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived

Proposed substitution does not affect dimensions and functional clearances

- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects

Submitted by:	
Signed by:	
Firm:	
Address:	
Telephone:	

A/E's REVIEW AND ACTION

	Substitution approved - Make submittals in accordance with Specification Section 01 25 00	
	Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00	
	Substitution rejected - Use specified materials.	
	Substitution Request received too late - Use specified materials.	
Signed by:		D

SECTION 02 41 19 - SELECTIVE 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 dispose of them off-site unless indicated to be salvaged or reinstalled.

B. Remove and Salvage: Detach items from existing construction, in a manner to prevent damage, and store.

C. Remove and Reinstall: Detach items from existing construction, in a manner to prevent damage, prepare for reuse, and reinstall where indicated.

D. Existing to Remain: Leave existing items that are not to be removed and that are not otherwise indicated to be salvaged or reinstalled.

E. Dismantle: To remove by disassembling or detaching an item from a surface, using gentle methods and equipment to prevent damage to the item and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

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 areas where existing construction is to remain and requires protection.

1.6 INFORMATIONAL SUBMITTALS

A. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property and for dust control. Indicate proposed locations and construction of barriers.

B. Schedule of Selective Demolition Activities: Indicate the following:

1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's building manager's and other tenants' on-site operations are uninterrupted.
2. Interruption of utility services. Indicate how long utility services will be interrupted.
3. Coordination for shutoff, capping, and continuation of utility services.
4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.

C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations.

1.7 CLOSEOUT SUBMITTALS

A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 FIELD CONDITIONS

A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.

B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Storage or sale of removed items or materials on-site is not permitted.

F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.

1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 COORDINATION

A. Arrange selective demolition schedule so as not to interfere with Owner's operations.

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 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. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

1. Arrange to shut off utilities with utility companies.

3.3 PROTECTION

A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.

1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.

2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
4. Cover and protect furniture, furnishings, and equipment that have not been removed.

3.4 SELECTIVE DEMOLITION, GENERAL

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

1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping. Temporarily cover openings to remain.
3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
4. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
5. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
6. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
7. Dispose of demolished items and materials promptly.

B. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

C. Removed and Reinstalled Items:

1. Clean and repair items to functional condition adequate for intended reuse.
2. For items not immediately re-installed, pack or crate items after cleaning and repairing. Identify contents of containers.
3. Protect items from damage during transport and storage.
4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.

D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

A. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight. See Section for new roofing requirements.

1. Remove existing roof membrane, flashings, copings, insulation, cover board, and roof accessories.
2. Remove existing roofing system down to metal roof deck.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

A. Remove demolition waste materials from Project site and dispose of them in an EPA-approved construction and demolition waste landfill acceptable to authorities having jurisdiction.

1. Do not allow demolished materials to accumulate on-site.
2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.

B. Burning: Do not burn demolished materials.

3.7 CLEANING

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

END OF SECTION 024119

SECTION 03 95 00 - CONCRETE REPAIR

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Concrete repair including repair of spalled or missing concrete, voids using concrete repair mortar, and repair of cracks in concrete

B. Spalls, Missing Concrete: Concrete repair work of spalled or missing concrete include:

1. Exposing and undercutting reinforcing steel
2. Repairing, cleaning, and treating reinforcing steel
3. Edge and surface conditioning of concrete area to be patched
4. Application of bonding agent
5. Application of concrete repair mortar
6. Finishing of the concrete patch to match adjoining surfaces

C. Cracks: Concrete crack repair work includes:

1. Cleaning surface of cracked concrete
2. Application of gravity penetrating crack sealer to repair hairline surface cracks
3. Epoxy pressure injection of cracks to repair cracks.

1.2 SUBMITTALS

A. Product Data: Submit product data for proprietary materials and items, including patching materials and forming accessories, bonding compounds, curing and coating compounds.

B. Repair Procedures: Submit repair mortar manufacturer’s narrative description of procedures and methods for removal of concrete, repairing and cleaning of reinforcing steel, and applying new repair mortar and coatings.

C. Statement of Application: Provide a statement, signed by authorized representative of patching materials manufacturer, that manufacturer has reviewed contract documents and project conditions relating to concrete repair and that manufacturer's materials proposed for use are suitable for the applications indicated.

D. Certification: Submit manufacturer's certification that products provided comply with specified requirements.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Engage an Installer with not less than 5 years of successful experience providing concrete repairs similar in size and complexity to that required for this project and approved by the repair material manufacturer.

B. Standards: Comply with provisions of the following Codes and Standards, except where the contract documents indicate requirements that are more stringent.

1. ACI 318, "Building Code Requirements for Reinforced Concrete, latest edition
2. Concrete Reinforcing Steel Institute (CRSI), "Manual of Standard Practice", latest edition

C. Testing: The Owner may engage a testing laboratory to perform material evaluation tests.

1. Materials and installed work may require testing and re-testing at any time during the progress of the work. Re-testing of rejected materials for installed work shall be done at the Contractor's expense.

D. Preparation Field Sample: Provide a field sample of concrete prepared for application of repair mortar, including undercutting and preparation of reinforcing steel, for Architect of Record's review prior to proceeding with the coating. The sample shall be an area approximately 1’-0" x 1'-0". Locate as determined by the Architect of Record.

E. Concrete Mortar Repair Field Sample: Provide an in-place field sample installation of one mortar patch area of spalled concrete for Architect of Record's review prior to proceeding with repairs. Install field sample at final approved preparation sample specified above, in the presence of the Architect of Record.

1.4 PROJECT CONDITION

A. Environmental Conditions: Perform concrete repairs only when weather and forecasted weather conditions comply with requirements of repair material manufacturer.

PART 2 - PRODUCTS

2.1 FORM- MATERIALS

A. Forms for Exposed Concrete: Plywood panel materials, to provide continuous, straight, smooth, exposed surfaces

1. Use overlaid plywood complying with U.S. Product Standard PS-1 "A-C or B-B High-Density Overlaid Concrete Form", Class I.
2. Use plywood complying with U.S. Product Standard PS-1 "B-B (Concrete Form) Plywood", Class I, Exterior Grade or better, mill-oiled and edge-sealed, with each piece bearing legible inspection trademark.

2.2 REINFORCING MATERIALS

A. Replacement Reinforcing Bars: ASTM A 615, Grade 60 deformed.

B. Supports for Reinforcement: Provide supports for replacement reinforcement as necessary including wire ties and spacers, and other devices for spacing, supporting, and fastening reinforcing bars in place.

2.3 REPAIR MATERIALS

A. Bonding Agent: Multi-component, solvent-free, moisture-tolerant epoxy-modified cementitious product formulated as a bonding agent and anti-corrosion coating.

1. Corrosion Inhibition: Provide material proven by independent laboratory testing to prevent corrosion of reinforcing steel when tested under procedures of the Federal Highway Administration Program Report FHWA/RD88/193.
2. Bond Strength:

a. Plastic Concrete to Hardened Concrete: Wet on Wet: 2800-psi min., 14 days moist cure, per ASTM C-882
b. Steel Reinforcement to Concrete: 625-psi min., pullout test.

3. Products:

a. Sika Armatec 110 EpoCem; Sika Corp
b. Sto Epoxy Adhesive; Sto Concrete Restoration Division
c. Duralprep AC, Euclid Chemical Company
d. SurePoxy HM EPL, Kuafman Products, Inc

B. Repair Mortar: Silica fume polymer-modified Portland cement mortar intended for use as a patching mortar at thicknesses of 1/2" and greater, freeze-thaw resistant, compatible with the coefficient of thermal expansion of concrete.

1. Flowable Mortar:

a. Bond Strength: 2200 psi at 28 days, per ASTM C-882 modified.
b. Flexural Strength: 720-psi min at 28 days, per ASTM C-293.
c. Splitting Tensile Strength: 500-psi min. at 28 days, per ASTM C-496
d. Compressive Strength: 3000 psi at 1 day, 6500 psi at 28 days, per ASTM C 109
e. Products:

1) SikaTop 111 Plus; Sika Corp
2) Sto Flowable Mortar; Sto Concrete Restoration Division
3) Duraltop Flowable Mortar, Euclid Chemical Company
4) MasterEmaco N 400, BASF

2. Non-Sag Mortar:

a. Bond Strength: 1000 psi at 28 days, per ASTM C-882 modified.
b. Flexural Strength: 1000-psi min at 28 days, per ASTM C-293.
c. Splitting Tensile Strength: 400-psi min. at 28 days, per ASTM C-496

d. Compressive Strength: 1500 psi at 1 day, 4300 psi at 28 days, per ASTM C 109
e. Product:

1) SikaTop 123 Plus; Sika Corp.
2) Sto Trowel Grade Mortar; Sto Concrete Restoration Division
3) Duraltop Gel, Euclid Chemical Company

C. Penetrating Crack Sealer: Two-component 100% solids epoxy crack penetrating sealer; conforming to ASTM C881.

1. Products:

a. Sikadur 55SLV Healer/Sealer; Sika Corporation
b. Sto Flexible Crack Sealer; Sto Concrete Restoration Division
c. Dural 335, Euclid Chemical Company

D. Pressure Injection Crack Repair: Two-component 100% solids epoxy crack repair; cap sealer and pressure injection epoxy conforming to ASTM C881.

1. Products:

a. Sikadur 33; and Injection epoxy: Sikadur Injection Gel; Sika Corporation
b. Sto Quick Set Epoxy Gel; and Injection epoxy: Sto Epoxy Binder; Sto Concrete Restoration Division
c. Dural Injection Gel, Euclid Chemical Company

E. Water: Drinkable

2.4 MIXING

A. Mix repair materials in accordance with manufacturer's instructions. Mix multi-component products using equipment recommended by the manufacturer. Only mix quantities that usable within its pot life.

PART 3 - EXECUTION

3.1 GENERAL

A. Coordinate the work required for the removal of the loose and delaminated concrete, the repair and cleaning of the exposed reinforcing steel, the placement of forms, and the placement of repair mortar to minimize the time that reinforcing steel is exposed.

3.2 CONCRETE SURFACE PREPARATION

A. Remove delaminated concrete and remove additional concrete as required to provide a minimum required thickness of repair material.

B. Edge Preparation: Make a minimum 1/2" deep saw-cut along the perimeter of repair areas. Make cut at right angle to surface. Avoid feather edges. Keep Geometric configurations or repair patches as simple as possible.

C. After removals and edge conditioning are complete, remove bond-inhibiting materials (dirt, concrete slurry, loosely bonded aggregates) by abrasive blasting or high-pressure water blasting with or without abrasive. Check the surfaces after cleaning to ensure that surface are free from additional loose aggregate, or that additional delaminations are not present.

D. If hydro-demolition is used, remove cement and particulate slurry from the prepared surfaces before slurry hardens.

3.3 EXPOSING AND UNDERCUTTING REINFORCING STEEL

A. Remove damaged or unsound concrete. Use concrete removal procedures that will not structurally weaken the surrounding precast concrete.

B. Once initial concrete removal takes place, undercut exposed oxidized (corroded) reinforcing to provide clearance for cleaning, full bar circumference bonding to surrounding concrete, and securing the patch structurally.

C. Provide minimum 3/4" clearance between exposed rebars and surrounding concrete or 1/4" larger than largest aggregate in repair mortar, whichever is greater.

D. Extend concrete removals along the bars to locations along the bar free of bond inhibiting corrosion and bonding well to surrounding concrete.

E. If unoxidized reinforcing steel is exposed during the undercutting process, care shall be taken not to damage the bar's bond to surrounding concrete. If the bond between bar and concrete is broken, undercutting of the bar shall be required.

F. Secure any loose reinforcement in place by tying to other secured bars or by other approved methods.

G. Condition edges of repair area by making 1/2 in. sawcut along the perimeter.

3.4 REPAIRING AND CLEANING OF REINFORCING STEEL

A. After removal of concrete, notify Architect of Record for inspection of steel reinforcing.

B. Completely replace reinforcing or add supplemental reinforcing over the affected section. Mechanically splice the new reinforcing bar to the existing bar or place the new bar parallel to and approximately 3/4" from the existing bar. Provide lap length in accordance with ACI 318.

C. Remove heavy oxides and scale from the exposed reinforcing bars, as necessary to ensure a maximum bond of the replacement material.

3.5 APPLYING REPAIR MORTAR

A. General: Perform repairs using flowable mortar or non-sag mortar as appropriate to conditions at each location.

B. Forms:

1. Support, brace, and maintain forms as required to support loads that might be applied. Construct formwork to provide a concrete repair patch of correct size, shape, and alignment.
2. Construct forms of one piece with accurate alignment, location, grades, and plumb work in finished repair.
3. Fabricate forms for easy removal without hammering or prying against concrete surfaces.
4. Cleaning and Tightening: Thoroughly clean forms and adjacent surfaces to receive repair mortar. Remove chips, wood, sawdust, dirt or other debris just before placing concrete. Tighten forms and bracing before repair mortar placement to prevent mortar leaks and maintain alignment.

C. Preparation of Form Surfaces:

1. Coat contact surfaces of forms with a nonresidual, form-coating compound.
2. Do not allow excess form-coating material to accumulate on forms or to come into contact with existing concrete surfaces against which repair mortar will be placed. Apply in compliance with manufacturer's instructions.

D. Repair Mortar Placement:

1. Apply bonding compound to prepared concrete and reinforcing steel surfaces. Apply in compliance with manufacturer's instructions at coverage rate recommended for performance as a bonding agent and as a corrosion inhibitor.
2. Deposit repair mortar continuously in a manner to avoid segregation at its final location and in accordance with manufacturer's instructions.

E. Finish of Formed Surfaces: Provide an as-cast concrete surface to match the existing cast in place concrete surface, with a minimum of seams. Repair and patch defective areas including fins and other projections completely removed and smoothed. Match approved field sample.

F. Curing and Protection: Protect freshly placed repair mortar from premature drying and excessive cold or hot temperatures.

3.6 PENETRATING CRACK SEALER APPLICATION

A. Clean and prepare cracked concrete surfaces in accordance with sealer manufacturer's instructions. Concrete shall be clean, sound, and free of surface moisture, Remove dust, laitance, grease, oils, curing compounds, waxes, impregnations, foreign particles, coatings and disintegrated materials by mechanical means.

B. Apply penetrating crack sealer to cracked concrete surfaces, in accordance with manufacturer's instructions.

3.7 PRESSURE INJECTION CRACK REPAIR

A. Prepare concrete cracks in accordance with sealer manufacturer's instructions. Cracks and surface 1” on each side of crack shall be clean, sound, and free of surface water (may be damp but not wet). Remove dust, laitance, grease, oils, curing compounds, waxes, impregnations, foreign particles, coatings and disintegrated materials by mechanical means from one inch on each side of the crack. Blow cracks clean with oil-free compressed air.

B. Mix repair materials according to manufacturer’s instructions.

C. Install injection ports. Apply cap seal, trowel grade (nonsag) epoxy, to the crack forcing epoxy around the ports and sealing the crack. Allow the epoxy to cure before pressure injecting the crack.

D. Pressure-inject epoxy into ports to fill cracks using pressure injection equipment recommended by the epoxy manufacturer.

END OF SECTION 039500

SECTION 06 10 00 - 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
2. Plywood
3. Fasteners

B. Related Requirements:

1. Section 07 62 00 "Sheet Metal Flashing and Trim" for metal roof flashings
2. Section 07 92 00 "Joint Sealants" for joint sealants, joint fillers, and joint preparation

1.3 DEFINITIONS

A. Boards or Strips: Lumber of less than 2 inches nominal size in least dimension.

B. Dimension Lumber: Lumber of 2 inches nominal size or greater but less than 5 inches nominal size in least dimension.

C. Exposed Framing: Framing not concealed by other construction

D. OSB: Oriented strand board

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. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.

1.5 INFORMATIONAL SUBMITTALS

A. Material Certificates: For dimension lumber specified to comply with the minimum, allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.

B. Evaluation Reports: For the following, from ICC-ES:

1. Fire-retardant-treated wood
2. Power-driven fasteners
3. Post-installed anchors
4. Metal framing anchors

1.6 QUALITY ASSURANCE

A. Testing Agency Qualifications: For the 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 wood products flat with spacers beneath and between each bundle to provide air circulation. Protect wood products 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, comply with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Grade lumber 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. Dress lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

C. Engineered Wood Products: Acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable design stresses, as published by manufacturer, shall meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

2.2 FIRE-RETARDANT-TREATED MATERIALS

A. General: Where fire-retardant-treated materials are indicated, materials shall comply with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.

B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test

1. Treatment shall not promote corrosion of metal fasteners.
2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.

C. Kiln-dry lumber after treatment to maximum moisture content of 19 percent. Kiln-dry plywood after treatment to maximum moisture content of 15 percent.

D. Identify fire-retardant-treated wood with appropriate classification marking of qualified testing agency.

E. Application: Treat all rough 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

B. Dimension Lumber Items: Construction or No. 2

C. Concealed Boards: 15 percent maximum moisture content, any species and grades:

D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.

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

F. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

2.4 PLYWOOD

A. Plywood, DOC PS 1, Exterior, A-C in thickness indicated or, if not indicated, not less than 3/4-inch nominal thickness.

2.5 FASTENERS

A. General: Fasteners shall be of size and type indicated and shall comply with requirements specified in this article for material and manufacture.

1. Provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

C. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.

D. Post-Installed Anchors: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC01, ICC-ES AC58, ICC-ES AC193, or ICC-ES AC308 as appropriate for the substrate.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.

E. Screw Anchors: screw type. Pre-drill hole with a standard ANSI drill bit with the same diameter as the anchor and install the anchor with an impact wrench. Provide anchors with a diameter and anchor length marking on the head.

1. Exterior Use: As indicated on the Drawings, provide stainless steel anchors manufactured from materials conforming to ISO 3506 Part 1 and having corrosion resistance equivalent to AISI Type 304 stainless steel. Stainless steel anchors shall be provided with stainless steel nuts and washers of matching alloy group and minimum proof stress equal to or greater than the specified minimum full-size tensile strength of the externally threaded fastener and conforming to ISO 3506 Part 2 unless otherwise specified. Avoid installing stainless steel anchors in contact with galvanically dissimilar metals.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated

B. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.

C. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry accurately to other construction. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.

D. Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Sort and select lumber so that natural characteristics do 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. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

G. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:

1. ICC-ES evaluation report for fastener

H. Use steel common nails unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood. Drive nails snug but do not countersink nail heads unless otherwise indicated.

3.2 WOOD BLOCKING, AND NAILER INSTALLATION

A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces unless otherwise indicated.

3.3 PROTECTION

A. Protect wood 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 rough carpentry from weather. If, despite protection, rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 061000

SECTION 07 54 23 - THERMOPLASTIC-POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Adhered thermoplastic polyolefin (TPO) roofing system
2. Roof insulation
3. Cover board
4. Walkways
5. Fluid-applied Silicone Roof Coating

B. Related Requirements:

1. Section 06 10 00 - “Rough Carpentry” for fasteners and blocking
2. Section 07 92 00 "Joint Sealants" for joint sealants, joint fillers, and joint preparation

1.3 DEFINITIONS

A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing Manual: Membrane Roof Systems" apply to Work of this Section.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Roofing Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, roofing Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
5. Review structural loading limitations of roof deck during and after roofing.
6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects the roofing system.
7. Review governing regulations and requirements for insurance and certificates if applicable.

8. Review temporary protection requirements for roofing system during and after installation.
9. Review roof observation and repair procedures after roofing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product

1. For insulation and roof system component fasteners, include copy of FM Approvals' RoofNav listing.

B. Shop Drawings: Include roof plans, sections, details, and attachments to other work, including the following:

1. Layout and thickness of insulation, if applicable
2. Base flashings and membrane termination details
3. Flashing details at penetrations.
4. Tapered insulation layout, thickness, and slopes, if applicable

C. Samples for Verification: For the following products:

1. Roof membrane and flashings, of color required.
2. Walkway pads or rolls, of color required.

D. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer

B. Manufacturer Certificates:

1. Special Warranty Certificate: Signed by roof membrane manufacturer, certifying that all materials supplied under this Section are acceptable for special warranty.

C. Product Test Reports: For roof membrane and insulation, for tests performed by a qualified testing agency, indicating compliance with specified requirements.

D. Evaluation Reports: For components of roofing system, from ICC-ES

E. Field Test Reports:

1. Membrane adhesion field test

F. Sample Warranties: For manufacturer's special warranties.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals

1.8 QUALITY ASSURANCE

A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store the materials in a dry location. Comply with the insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Handle and store the roofing materials, and place the equipment in a manner to avoid the permanent deflection of the deck.

1.10 FIELD CONDITIONS

A. Weather Limitations: Proceed with the installation only when the existing and forecasted weather conditions permit the installation of the roofing system according to manufacturer's written instructions and warranty requirements.

1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within the specified warranty period.

1. Special warranty includes roof membrane, base flashings, fasteners and other components of the roofing system.
2. Warranty Period: 15 years from the date of Substantial Completion

B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of

roofing system such as roof membrane, base flashing, fasteners, for the following warranty period:

1. Warranty Period: Two years from the date of Substantial Completion

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Installed roofing system and flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roof system and flashings shall remain watertight.

1. Accelerated Weathering: Roof membrane shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
2. Impact Resistance: Roof membrane shall resist impact damage when tested according to ASTM D 3746, ASTM D 4272, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.

B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roof membrane manufacturer based on testing and field experience.

C. Wind Uplift Resistance: Design roofing system to resist the following wind uplift pressures when tested according to FM Approvals 4474, UL 580, or UL 1897:

1. Zone 1 (Roof Area Field): 60 lbf/sq. ft.
2. Zone 2 (Roof Area Perimeter): 90 lbf/sq. ft.

    a. Location: From roof edge to 5-feet inside roof edge

3. Zone 3 (Roof Area Corners): Insert lbf/sq. ft.

    a. Location: 5-feet in each direction from each building corner

D. FM Approvals' RoofNav Listing: Roof membrane, base flashings, and component materials shall comply with requirements in FM Approvals 4450 or FM Approvals 4470 as part of a roofing system, and shall be listed in FM Approvals' RoofNav for Class 1 or noncombustible construction, as applicable. Identify materials with FM Approvals Certification markings.

1. Fire/Windstorm Classification: Class 1A-90
2. Hail-Resistance Rating: SH

E. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

F. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of the applicable testing agency.

2.2 THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

A. TPO Sheet: ASTM D 6878/D 6878M, internally fabric- or scrim-reinforced, fabric-backed TPO sheet

1. Acceptable products:

a. Firestone: Ultraply TPO XR
b. GAF: Everguard Extreme
c. Versico: VersiFleece
d. Trimco: TPA Fleece-Back

2. Source Limitations: Obtain components for the roofing system from roof membrane manufacturer or manufacturers approved by the roof membrane manufacturer.
3. Thickness: Minimum 60 mils, nominal
4. Exposed Face Color: White

2.3 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for the intended use and compatible with other roofing components.

1. Adhesive and Sealants: Comply with VOC limits of authorities having jurisdiction.

B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, minimum 55 mils thick, minimum, of the same color as TPO sheet.

C. Prefabricated Pipe Flashings: As recommended by roof membrane manufacturer.

D. Slip Sheet: Manufacturer's standard, of thickness required for the application.

E. Metal Termination Bars: Manufacturer's standard, pre-drilled stainless steel or extruded aluminum bars, 3/4 by 0.090-inch minimum thick with anchors, angled lip sealant receiver and lower leg bulb stiffener.

F. Cover tape: A 6-inch wide, 0.045 mil reinforced TPO membrane with a 3-inch self-adhered area, designed for use as a cover strip overcoated and non-coated metal edges and flanges.

G. Sealant Pans: 24 gauge steel with 0.025” thick TPO based film as required for fabrication into sealant pans. Standard sheet size: 4’ x 10’, sheet weight 47 lbs.

H. Roof Transition Anchor Strips: 0.045” reinforced TPO membrane with pressure sensitive adhesive, for installation on horizontal surfaces using plates and fasteners as a base attachment in fully adhered systems. Size: 6” x 100’

I. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roofing components to the substrate, and acceptable to roofing system manufacturer.

J. Miscellaneous Accessories: Provide pourable sealers, preformed cone, and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination

reglets, 100% solids urethane based two-part sealant suitable for filling sealant pans, and other accessories.

K. Detailing Membrane: 55-mil thick minimum un-reinforced weldable membrane capable of easy forming flashing for penetrations corners, and curbs where preformed products will not fit and where indicated.

L. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2 inch wide and 1/8 inch thick.

M. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

N. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene

O. Preformed Vent Boots: 0.075” thick molded TPO membrane sized to accommodate most common pipe and conduits, (1” to 6” diameter pipes), including the square tube. Hot-air weld the boots directly to the TPO membrane, and supplied with stainless steel clamping rings

P. Pourable Sealant Pockets: 0.070 thick molded penetration pocket to provide structure and foundation for the application of a pourable sealant for a variety of roof penetrations, weldable and 9" x 6" x 4" (l x w x h)

2.4 ROOF INSULATION

A. General: Preformed roof insulation boards manufactured or approved by TPO roof membrane manufacturer and matching existing.

B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces Verify with existing insulation

1. Compressive Strength: 20 psi

C. Tapered Insulation: Provide factory-tapered insulation boards.

1. Material: Match roof insulation
2. Minimum Thickness: 1/4 inch
3. Slope:

a. Roof Field: 1/4 inch per foot minimum Coordinate with existing slopes.
b. Saddles and Crickets: 1/2 inch per foot unless otherwise indicated on Drawings.

2.5 INSULATION ACCESSORIES

A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with other roofing system components.

B. Fasteners: Factory-coated steel fasteners with metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening roof insulation and cover boards to the substrate, and acceptable to roofing system manufacturer.

C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to the substrate or to another insulation layer as follows:

1. Modified asphaltic, asbestos-free, cold-applied adhesive

D. Cover Board: ASTM C 208, Type II, Grade 2, cellulosic-fiber insulation board, and 1/2 inch thick. Verify with existing

2.6 ASPHALT MATERIALS

A. Roofing Asphalt: ASTM D 312/D 312M, Type III or Type IV

B. Asphalt Primer: ASTM D 41/D 41M.

2.7 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch thick and acceptable to roofing system manufacturer.

1. Size: Approximately 36 by 60 inches
2. Color: Tan

2.8 FLUID-APPLIED ROOF COATING

A. Silicone Roof Coating: Solvent free one-component moisture curing silicone rubber roof coating

1. Acceptable products:

a. Henry Company: Pro-Grade® 988 Silicone Roof Coating
b. Neogard, Inc: Neogard 7870 Roof Coating
c. Uniflex: Silicone 44 Roof Coating

2. Accessory Products:

a. Primer: Stain blocking water base acrylic primer as recommended by the Coating manufacture
b. Cleaner: Biodegradable detergent was suitable for cleaning designated surfaces.
c. Reinforcing fabric: Stitch bonded, high performance fabric reinforcement sheet

3. Color: White

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting the performance of the Work.

1. Verify that the roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that the nailers match thicknesses of insulation.
3. Verify that concrete substrate is visibly dry and free of moisture, and that minimum concrete internal relative humidity is not more than **75** percent, or as recommended by roofing system manufacturer, when tested according to ASTM F 2170.

    a. Test Frequency: Four test probe approximately at equal distances from each other along the concrete edge
    b. Submit test reports within 24 hours after performing tests.

4. Verify that joints at the top of precast concrete have been sealed flush with the top of concrete.

B. Proceed with installation only after correcting unsatisfactory conditions.

3.2 DEMOLITION OF EXISTING CONSTRUCTION

A. Remove all flashings, and related component around the perimeter of the roof, at curbs and penetrations, and at penthouse walls.

B. Remove existing roof membrane and roof insulation where it does not provide a suitable condition for installation of TPO membrane.

C. Power-wash existing roof membrane and allow to dry. Remove loose granules by sweeping, power brooming, or vacuuming. Spud existing roof as required to achieve a strong bond of the TPO membrane to the surface.

3.3 PREPARATION

A. Clean the substrate of dust, debris, moisture, and other substances detrimental to roofing system installation according to roofing system manufacturer's written instructions. Remove sharp projections.

B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when weather reports forecast rain.

3.4 ROOFING INSTALLATION, GENERAL

A. Install roofing system according to roofing system manufacturer's written instructions, FM Approvals' RoofNav assembly requirements, and FM Global Property Loss Prevention Data Sheet 1-29.

B. By the end of the workday or before the start of forecasted precipitation, complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of the roofing system. Remove and discard temporary seals before beginning Work on adjoining roofing.

C. Install roof membrane and auxiliary materials to tie into existing roofing to maintain weather tightness of transition.

3.5 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at end of the workday.

B. Comply with the roofing system and roof insulation manufacturer's written instructions for installing roof insulation.

C. Install tapered insulation under the area of roofing to conform to slopes indicated.

D. Install insulation with long joints of insulation in a continuous straight line, with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch with insulation.

1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.

E. Install insulation under the area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches or greater, install two or more layers with joints of each succeeding layer staggered from joints of the previous layer a minimum of 6 inches in each direction.

F. Install tapered edge strips at perimeter edges of the roof that do not terminate at vertical surfaces.

G. Mechanically Fastened and Adhered Insulation: Install the first layer only of insulation to the deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten the first layer of insulation to resist uplift pressure at corners, perimeter, and field of the roof.
2. Set each subsequent layer of insulation including cover board in a uniform coverage of manufacturer’s recommended full-spread insulation adhesive, firmly pressing and maintaining insulation in place.

H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each

direction. Loosely butt cover boards together. Tape joints if required by roofing system manufacturer.

1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of the roof.

3.6 INSTALLATION OF COVER BOARDS

A. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction.

1. Trim cover board neatly to fit around penetrations and projections, and to fit tight to intersecting sloping roof decks.
2. At internal roof drains, conform to the slope of drain sump.

    a. Trim cover board so that water flow is unrestricted.

3. Cut and fit cover board tight to nailers, projections, and penetrations.
4. Adhere cover board to the substrate using adhesive according to FM Approvals' RoofNav assembly requirements and FM Global Property Loss Prevention Data Sheet 1-29 for specified Windstorm Resistance Classification, as follows:

    a. Set cover board in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F of equiviscous temperature.

3.7 ADHERED ROOFING INSTALLATION

A. Adhere the roof membrane over the area to receive roofing according to roofing system manufacturer's written instructions.

B. Unroll roof membrane and allow it to relax before installing.

C. Accurately align roof membrane, and maintain uniform side and end laps of minimum dimensions required by the manufacturer. Stagger end laps.

D. Hot Roofing Asphalt: Apply a solid mopping of hot roofing asphalt to the substrate at temperature and rate required by the manufacturer, and install fabric-backed roof membrane. Do not apply to splice area of the roof membrane.
1. Place membrane without wrinkles and buckles. Remove any wrinkles or buckles from the sheet prior to permanent attachment. Fully adhere roof membrane immediately after rolling it out and follow by welding to the adjacent sheets.
2. Overlap roof membrane a minimum of 3” for side laps and 3” for end laps.
3. Install membrane so that the side laps run across the roof slope lapped towards drainage points.
4. All exposed sheet corners shall be rounded a minimum of 1”.
5. Use full-width rolls in the field and perimeter region of the roof.
6. Adhere the membrane sheets fully to the substrate with hot roofing asphalt at a rate of 25 lbs per 100 square feet.

7. Prevent seam contamination by keeping the asphalt application a few inches back from the seam area.
8. Adhere approximately one-half of the membrane sheets at a time. Fold back one-half of the sheet's length in turn to allow for asphalt application. Lay membrane into asphalt immediately after application.
9. Roll membrane with a weighted roller to ensure complete bonding between asphalt and membrane.
10. Hot-air-weld the membrane laps together. Make all welds continuous, without voids or partial welds. Make all welds with no burns and scorch marks.
11. Weld shall be a minimum of 1-1/2" (39 mm) in width for automatic machine welding and a minimum 2" (52 mm) in width for hand welding.
12. Seal all cut edges of the reinforced membrane with manufacturer's sealant specifically made for cut edges.
13. Provide supplemental membrane attachment at the base of all the walls and curbs and where the angle of the substrate changes by more than five (5) degrees (1" in 12"). Secure roofing membrane to the structure with appropriate screws and plates spaced every 12" o.c. Install the screws and plates no less than ½" from the membrane edge. Alternatively, turn the roofing membrane up the vertical plane a minimum of 3" and secured with screws and a termination bar. Use the same fastener spacing as used for in-lap attachment. Install the termination bar within 1-1/2" to 2" of the plane of the roof membrane, with a minimum of 1" of membrane extending above the termination bar.
14. Install the fasteners to achieve the proper embedment depth. Install fasteners without lean or tilt.
15. Install fasteners so that the plate or termination bar tightly draws down to the membrane surface. Install the fasteners in a manner that will not allow the plate or termination bar to move (underdriving) and will not cause wrinkling of the membrane (overdriving).

E. In addition to adhering, mechanically fasten roof membrane securely at terminations, penetrations, and perimeter of roofing.

F. Apply roof membrane with side laps shingled with a slope of roof deck where possible.

G. Seams: Clean seam areas, overlap roof membrane, and hot-air weld side and end laps of roof membrane and sheet flashings, to ensure a watertight seam installation.

1. Test lap edges with a probe to verify seam weld continuity. Apply lap sealant to seal cut edges of roof membrane and sheet flashings.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roof membrane that do not comply with requirements.

H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roof membrane in place with a clamping ring.

3.8 BASE FLASHING INSTALLATION

A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.

B. Apply bonding adhesive to substrate and underside of sheet flashing at the required rate, and allow to partially dry. Do not apply to seam area of flashing.

C. Flash the penetrations and field-form the inside and outside corners with cured or uncured sheet flashing.

D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld the side and end laps to ensure a watertight seam installation.

E. Terminate and seal the top of sheet flashings and mechanically anchor to substrate through termination bars.

3.9 WALKWAY INSTALLATION

A. Flexible Walkways:

1. Install flexible walkways at the following locations:

    a. Locations indicated on Drawings.
    b. As required by roof membrane manufacturer's warranty requirements.

2. Provide 6-inch clearance between adjoining pads.
3. Heat-weld to substrate or adhere walkway products to the substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.10 FIELD QUALITY CONTROL

A. Perform the following tests:

B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.

1. Notify Architect and Owner 48 hours in advance of date and time of inspection.
2. Accompany the manufacturer's technical inspector, and assist with equipment and workers if necessary to provide access to the roof. Correct all defects noted during the inspection.

C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.

D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

3.11 PROTECTING AND CLEANING

A. Protect the roofing system from damage and wear during the remainder of the construction period. When remaining construction does not affect or endanger the roofing system, inspect roofing system for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.

B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at the time of Substantial Completion and according to warranty requirements.

3.12 ROOFING INSTALLER'S WARRANTY

A. WHEREAS _____ of _____, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:

1. Owner: Gary Housing Authority
2. Address: 578 Broadway
3. Building Name/Type: Mosby Senior Citizen Building
4. Address: 650 Jackson.
5. Area of Work: Full area of roof over an existing membrane
6. Acceptance Date: _____
7. Warranty Period: 2 years
8. Expiration Date: _____

B. AND WHEREAS Roofing Installer has contracted (either directly with Owner or indirectly as a subcontractor) to warrant said work against leaks and faulty or defective materials and workmanship for designated Warranty Period,

C. NOW THEREFORE Roofing Installer hereby warrants, subject to terms and conditions herein set forth, that during Warranty Period Roofing Installer will, at Roofing Installer's own cost and expense, make or cause to be made such repairs to or replacements of said work as are necessary to correct faulty and defective work and as are necessary to maintain said work in a watertight condition.

D. This Warranty is made subject to the following terms and conditions:

1. Specifically excluded from this Warranty are damages to work and other parts of the building, and to building contents, caused by:

    a. lightning;
    b. peak gust wind speed exceeding 110 mph;
    c. fire;
    d. failure of roofing system substrate, including cracking, settlement, excessive deflection, deterioration, and decomposition;
    e. faulty construction of parapet walls, copings, chimneys, skylights, vents, equipment supports, and other edge conditions and penetrations of the work;
    f. vapor condensation on the bottom of roofing; and
    g. activity on roofing by others, including construction contractors, maintenance personnel, other persons, and animals, whether authorized or unauthorized by Owner

2. When work has been damaged by any of foregoing causes, Warranty shall be null and void until such damage has been repaired by Roofing Installer and until cost and expense thereof have been paid by Owner or by another responsible party so designated.

3. Roofing Installer is responsible for damage to work covered by this Warranty but is not liable for consequential damages to building or building contents resulting from leaks or faults or defects of work.
4. During Warranty Period, if Owner allows alteration of work by anyone other than Roofing Installer, including cutting, patching, and maintenance in connection with penetrations, attachment of other work, and positioning of anything on roof, this Warranty shall become null and void on date of said alterations, but only to the extent said alterations affect work covered by this Warranty. If Owner engages Roofing Installer to perform said alterations, Warranty shall not become null and void unless Roofing Installer, before starting said work, shall have notified Owner in writing, showing reasonable cause for the claim, that said alterations would likely damage or deteriorate work, thereby reasonably justifying a limitation or termination of this Warranty.
5. During Warranty Period, if original use of roof is changed and it becomes used for, but was not originally specified for, a promenade, work deck, spray-cooled surface, flooded basin, or other use or service more severe than originally specified, this Warranty shall become null and void on date of said change, but only to the extent said change affects work covered by this Warranty.
6. The owner shall promptly notify Roofing Installer of observed, known, or suspected leaks, defects, or deterioration and shall afford reasonable opportunity for Roofing Installer to inspect work and to examine evidence of such leaks, defects, or deterioration.
7. This Warranty is recognized to be the only warranty of Roofing Installer on said work and shall not operate to restrict or cut off Owner from other remedies and resources lawfully available to Owner in cases of roofing failure. Specifically, this Warranty shall not operate to relieve Roofing Installer of responsibility for the performance of original work according to requirements of the Contract Documents, regardless of whether Contract was a contract directly with Owner or a subcontract with Owner's General Contractor.

E. IN WITNESS THEREOF, this instrument has been duly executed this _____ day of _____, _____.

1. Authorized Signature: _____
2. Name: _____
3. Title: _____

END OF SECTION 075423

SECTION 07 62 00 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Formed low-slope roof sheet metal fabrications

B. Related Requirements:

1. Section 06 10 00 “Rough Carpentry**”** for wood nailers, curbs, and blocking
2. Section 07 54 23 “Thermoplastic-Polyolefin (TPO) Roofing”
3. Section 079200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leak-proof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of expansion joints and expansion-joint covers, including showing the direction of expansion and contraction from fixed points.

8. Include details of edge conditions.
9. Include details of special conditions.
10. Include details of connections to adjoining work.
11. Detail formed flashing and trim at a scale of not less than 3 inches per 12 inches.
12. Provide three-dimensional details where applicable to show a thorough understanding of the Work.

C. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

D. Samples for Verification: For each type of exposed finish

1. Sheet Metal Flashing: 12 inches long by the actual width of the unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Factory Corner Fabrications: 12 inches long and in required profile showing one minimum welded or solder joint.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator

B. Product Certificates: For each type of roof edge flashing that is SPRI ES-1 tested and FM Approvals approved.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency

D. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

1. For roof edge flashings that are SPRI ES-1 tested and FM Approvals approved, shop shall be listed as able to fabricate the required details as tested and approved.

B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for fabrication and installation.

1. Build a mockup of the typical roof edge as will occur at precast concrete overhangs, approximately 10 feet long, including supporting construction cleats, seams, attachments**,** underlayment, and accessories.
2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.9 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within the specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

    a. Color fading more than 5 Hunter units when tested according to ASTM D 2244
    b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    c. Cracking, checking, peeling, or failure of paint to adhere to bare metal

2. Finish Warranty Period: 20 years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless requirements that are more stringent are indicated.

C. FM Approvals Listing: Manufacture and install roof edge flashings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with the name of fabricator and design approved by FM Approvals.

D. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:

1. Design Pressure: 100 psf.

E. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, the opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 coating designation or aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40; pre-painted by the coil-coating process to comply with ASTM A 755/A 755M.

1. Surface: Smooth, flat unless indicated otherwise and mill phosphatized for field painting where indicated.
2. Exposed Coil-Coated Finish:

a. Three-Coat Fluoropolymer: AAMA 621: Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply a coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

3. Color: As selected by Architect from manufacturer's full range.
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.

2.3 UNDERLAYMENT MATERIALS

A. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft minimum.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners**,** solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by the 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 the 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 the color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on the weather side of metal.
b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.

2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Solder:

1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, Grade Sn50, 50 percent tin and 50 percent lead or Grade Sn60, 60 percent tin and 40 percent lead.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2 inch wide and 1/8 inch thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; 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 according to ASTM D 1187.

H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for the application.

2.5 FABRICATION, GENERAL

A. General: Custom-fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of the item required. Fabricate sheet metal flashing and trim in the shop to the 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 to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners 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 indicated on Drawings and within a 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. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with butyl sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

E. Sealant Joints: Where movable, non-expansion-type joints are required, form metal to provide for proper installation of an elastomeric sealant according to cited sheet metal standard.

F. Fabricate cleats and attachment devices from the same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than the thickness of metal being secured.

H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

I. Do not use graphite pencils to mark metal surfaces.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop): Fabricate in minimum 96-inch long, but not exceeding 12-foot long sections. Furnish with 6-inch wide, joint cover plates. Shop-fabricate interior and exterior corners**.**

1. Joint Style: Overlapped, 4 inches wide unless indicated otherwise and butted with expansion space and 6-inch wide, exposed cover plate where indicated
2. Fabricate from the Following Materials:

a. Galvanized Steel or Aluminum-Zinc Alloy-Coated Steel: 0.028-inch thick

2.7 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, sill, and similar flashings to extend 4 inches as indicated in drawings. Form head and sill flashing with 2-inch high, end dams. Fabricate from the following materials:

1. Galvanized Steel or Aluminum-Zinc Alloy-Coated Steel: 0.022-inch thick

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting the performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.

B. Proceed with installation only after correcting unsatisfactory conditions.

3.2 UNDERLAYMENT INSTALLATION

A. Apply slip-sheet that is wrinkle-free, over underlayment before installing sheet metal flashing and trim.

3.3 INSTALLATION, GENERAL

A. General: Anchor sheet metal flashing, trim, and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete the sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. 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 unless otherwise indicated. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
5. Do not torch cut sheet metal flashing and trim.
6. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by

painting contact surfaces with a bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.

C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints within 24 inches of corner or intersection.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with sealant concealed within joints.
2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches for nails and not less than 3/4 inch for wood screws or not less than recommended by fastener manufacturer to achieve maximum pullout resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize the possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch into the sealant. Form joints to completely conceal sealant. When the ambient temperature at the time of installation is 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 Section 079200 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to the width of 1-1/2 inches; however, reduce pre-tinning where the pre-tinned surface would show in completed Work.

1. Do not use torches for soldering.
2. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

H. Rivets: Rivet joints where necessary for strength.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements**,** sheet metal manufacturer's written installation instructions**,** and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch centers or as calculated according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with the installation of wall-opening components such as windows, doors, and louvers.

3.6 ERECTION TOLERANCES

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

3.7 CLEANING AND PROTECTION

A. Clean and neutralize flux materials. Clean off excess solder.

B. Clean off excess sealants.

C. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in a clean condition during construction.

D. Replace damaged sheet metal flashing and trim or deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 07 71 00 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Roof-edge drainage systems

B. Related Requirements:

1. Section 06 10 00 “Rough Carpentry” for wood nailers, curbs, and blocking.
2. Section 07 62 00 "Sheet Metal Flashing and Trim" for custom- and site-fabricated sheet metal flashing and trim.
3. Section 07 92 00 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Shop Drawings: For roof specialties.

1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
2. Include details for expansion and contraction; locations of expansion joints, including the direction of expansion and contraction.
3. Indicate profile and pattern of seams and layout of fasteners, cleats, clips, and other attachments.
4. Detail termination points and assemblies, including fixed points.
5. Include details of special conditions.

C. Samples for Initial Selection: For each type of roof specialty, indicated with factory-applied color finishes.

1.4 INFORMATIONAL SUBMITTALS

A. Sample Warranty: For the manufacturer's special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Do not store roof specialties in contact with other materials that might cause staining, denting, or other surface damage. Store roof specialties away from uncured concrete and masonry.

B. Protect strippable protective covering on roof specialties from exposure to sunlight and high humidity, except to the extent necessary for the period of roof-specialty installation.

1.7 FIELD CONDITIONS

A. Field Measurements: Verify profiles and tolerances of roof-specialty substrates by field measurements before fabrication, and indicate measurements on Shop Drawings.

B. Coordination: Coordinate roof specialties with flashing, trim, and construction of parapets, roof deck, roof and wall panels, and other adjoining work to provide a leak-proof, secure, and noncorrosive installation.

1.8 WARRANTY

A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 07 54 23 Thermoplastic-polyolefin (TPO) Roofing.

B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within the specified warranty period.

1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:

    a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 years from the date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Roof specialties shall withstand exposure to weather and resist thermally induced movement without failure, rattling, leaking, or fastener disengagement due to defective manufacture, fabrication, installation, or other defects in construction.

2.2 ROOF-EDGE DRAINAGE SYSTEMS

A. Acceptable Products:

1. Metal-Era Seal-Tite K-Style Gutter and Corrugated Downspouts
2. Architectural Products Co. Inc Formed Gutters and Downspouts
3. Alside Rainware System

B. Gutters: Manufactured in uniform section lengths, with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least 1 inch above the front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from the same metal as gutters.

1. Aluminum Sheet: 0.032-inch thick minimum
2. Gutter Profile: Style K according to SMACNA's "Architectural Sheet Metal Manual."
3. Corners: Factory mitered and mechanically clinched and sealed watertight
4. Gutter Supports: Manufacturer's standard supports as selected by Architect with finish matching the gutters.

C. Downspouts: Corrugated rectangular complete with machine-crimped elbows, manufactured from the following exposed metal. Furnish with metal hangers, from the same material as downspouts, and anchors.
1. Formed Aluminum: 0.032-inch thick.

D. Aluminum Finish: Three-coat fluoropolymer

1. Color: As selected by Architect from manufacturer's full range.

2.3 MATERIALS

A. Aluminum Sheet: ASTM B 209 alloy as standard with the manufacturer for finish required, with temper to suit forming operations and performance required.

2.4 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer's recommended fasteners, suitable for the application and designed to meet performance requirements. Furnish the following unless otherwise indicated:

1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching the color of sheet metal.

2. Fasteners for Aluminum: Aluminum or Series 300 stainless steel.

B. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant of type, grade, class, and use classifications required by the roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

E. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for the application.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

C. Appearance of Finished Work: Noticeable variations in the same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

D. Coil-Coated Aluminum Sheet Finishes:

1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

a. Three-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Examine walls, roof edges, and parapets for suitable conditions for roof specialties.

C. Verify that substrate is sound, dry, smooth, clean, sloped for drainage where applicable, and securely anchored.

D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by the manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 3-1/2 inches. Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by the manufacturer.

1. Bed flanges in a thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.

C. Expansion Provisions: Allow for thermal expansion of exposed roof specialties.

1. When the ambient temperature at the time of installation is between 40 and 70 deg F, set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by the roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F.

3.4 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with the installation of the roof-edge drainage system.

B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 12 inches apart. Attach ends with rivets and seal with sealant to make watertight. Slope to downspouts.

C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch away from walls; locate fasteners at top and bottom and at approximately 60 inches o.c.

1. Provide elbows at the base of downspouts at grade to direct water away from the building.

D. Splash Pans: Install where downspouts discharge on low-slope roofs.

3.5 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 and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces, including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.

D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 077100

SECTION 07 92 00 - 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. Rehabilitation and replacement of exterior weatherproofing sealants
2. Silicone joint sealants
3. Mildew-resistant joint sealants
4. Butyl joint sealants
5. Latex joint sealants
6. Preformed, foam joint seals
7. Epoxy sealant / adhesive

1.3 ACTION SUBMITTALS

A. Product Data: For each joint-sealant product

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. 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.

D. Joint-Sealant Schedule: Include the following information:

1. Joint-sealant application, joint location, and designation
2. Joint-sealant manufacturer and product name
3. Joint-sealant formulation
4. Joint-sealant color

1.4 INFORMATIONAL SUBMITTALS

A. Qualification Data: Installer Qualifications

B. Product Test Reports: For each kind of joint sealant, for tests performed by the contractor and witnessed by architect, manufacturer, or a qualified testing agency.

C. Field-Adhesion-Test Reports: For each sealant application tested

D. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by the manufacturer

B. Product Testing: Test joint sealants.

C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section. After sealant has achieved sufficient cure, conduct adhesion pull-tests. Leave approved mock-ups in place to establish standards and guidelines for acceptable application of sealant Work and acceptable appearance.

1.6 ADHESION TESTING

A. Field-Adhesion Testing: Before installing sealants, field-test their adhesion to Project joint substrates as follows:

1. Locate test joints as directed by Architect.
2. Conduct field tests for each kind of sealant and joint substrate.
3. Notify Architect seven days in advance of dates and times when the erection of test joints will take place.

    a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1.1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

        1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

4. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
5. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.7 FIELD CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by the joint-sealant manufacturer or are below 40 deg F.
2. When joint substrates are wet

3. Where joint widths are less than allowed by the joint-sealant manufacturer for applications indicated
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates

1.8 WARRANTY

A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within the specified warranty period.

1. Warranty Period: Two years from the date of Substantial Completion.

B. Standard Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in standard warranty within the specified warranty period.

1. Warranty Period: Manufacturers standard length of time from date of Substantial Completion.

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression
2. The disintegration of joint substrates from causes exceeding design specifications
3. Mechanical damage caused by individuals, tools, or other outside agents
4. Changes in sealant appearance caused by the 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 the joint-sealant manufacturer, based on testing and field experience.

B. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

C. Compatibility: Provide joint sealants and accessory materials that are compatible with one another, and with adjacent materials, as demonstrated by sealant manufacturer using ASTM C1087 testing and related experience.

D. Joint Sealant Standard: Comply with ASTM C 920 and other specified requirements for each joint sealant.

E. Stain Test Characteristics: Where sealants are required to be nonstaining, provide sealants tested per ASTM C 1248 as non-staining on porous joint substrates specified.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

1. BASF Corporation Construction Systems, 889 Valley Park Drive, Shakopee, MN 55379

    a. Masterseal NP 150

2. Dow Corporation, 2211 H.H. Dow Way, Midland, MI 48674

    a. Dowsil 790

3. Tremco, Inc., Commercial Sealants and Waterproofing Division, An RPM Company, Beachwood OH

    a. Tremco, Inc., Spectrem 1

B. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

1. BASF Corporation Construction Systems, 889 Valley Park Drive, Shakopee, MN 55379

    a. Masterseal NP 100

2. Dow Corporation, 2211 H.H. Dow Way, Midland, MI 48674

    a. Dowsil 795

3. Tremco, Inc., Commercial Sealants and Waterproofing Division, An RPM Company, Beachwood OH

    a. Spectrem 2

2.3 BUTYL JOINT SEALANTS

A. Butyl-Rubber-Based Joint Sealants: ASTM C 1311

1. Pecora Corporation, 165 Wambold Road, Harleysville, PA 19438

    a. BC-158

2. Tremco, Inc., Beachwood, OH 44122

    a. Tremco Butyl Sealant

3. C. L. Lawrence, 2503 E Vernon Avenue, Los Angeles, CA 90058-1897

    a. PTI 707

2.4 BUTYL TAPE

A. Preformed tape with solid polyisobutylene cross-linked butyl, preformed sealant on release roll; AAMA 800-92 specifications 804.3 and 807.3.

1. Tremco, Beachwood, OH 44122
    a. 440 Tape
2. Marco Industries, 4150 S. 100th E. Ave., Suite 301, Tulsa, OK 74146
    a. Mastix Butyl Tape
3. C. L. Lawrence, 2503 E Vernon Avenue, Los Angeles, CA 90058-1897
    a. GT Series Butyl Tapes

2.5 LATEX JOINT SEALANTS

A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF

1. Pecora Corp., Harleysville, PA 19438
    a. AVW 920
2. Tremco, Beachwood, OH 44122
    a. Tremflex 834
3. GE Silicones Huntersville, NC 28078
    a. RCS20

2.6 EPOXY SEALANTS

A. Epoxy resin adhesive sealant

1. Abatron, Inc., 5501-95th Avenue, Kenosha, Wisconsin 53144
    a. Best Bond Joint Sealant
2. 3M Center Building 0230-B-E-16, St. Paul, MN 55144-1000
    a. Epoxy Adhesive Sealant EG-2P-3005
3. Pro-Set Inc., 100 Patterson Ave, Bay City, MI 48707-0656
    a. M1007-M2032

2.7 PREFORMED, FOAM JOINT SEALS

A. Preformed, Pre-Compressed, Self- Expanding Foam Joint Seals: Manufacturer's standard joint seal manufactured from urethane or EVA (ethylene vinyl acetate) foam with minimum density of 10 lb/cu. ft. and impregnated with a nondrying, water-repellent agent. Factory produce in precompressed sizes in roll or stick form to fit joint widths based on design criteria indicated, with factory- or field-applied adhesive for bonding to substrates.

1. Tremco, Inc., Beachwood, OH 44122

    a. ExoAir® Trio

2. Marco Industries, 4150 S. 100th E. Ave., Suite 301, Tulsa, OK 74146

    a. X-Seal

3. Emseal Joint Systems Ltd, 25 Bridle Lane, Westborough, MA 01581

    a. UST

4. Design Criteria:

    a. Nominal Joint Width: Existing Condition; verify in the field.
    b. Movement Capability: 25 percent/+25 percent unless otherwise indicated

5. Joint Seal Color: As selected by Architect from the full range of manufacturer’s standard colors

2.8 JOINT-SEALANT BACKING

A. Sealant Backing Material, General: Non-staining; compatible with joint substrates, sealants, primers, and other joint fillers; and approved for applications indicated by sealant manufacturer based on field experience and laboratory testing

1. BASF, Shakopee, MN 55379

    a. Masterseal 920 and 921

2. Tremco, Beachwood, OH 44122

    a. Tremco Backer Rod

3. Nomaco, Zebulon, NC 27597

    a. HBR and OCFoam

4. Hohmann & Barnard, Inc, Hauppauge, NY 11788

    a. Standard Backer Rod

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin), Type O (open-cell material), Type B (bicellular material with a surface skin), or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, 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 the back of joint. Provide self-adhesive tape where applicable.

2.9 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by the joint-sealant manufacturer where required for adhesion of the sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Non-staining, 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 the performance of the Work.

B. Proceed with the installation only after the completion of corrections of the unsatisfactory conditions.

C. Examination of Existing Joint Sealants: Examine existing joint sealants and indicate the extent of joint sealant replacement and rehabilitation on shop drawings. Examine joints for compliance with requirements for joint configuration, installation tolerances, the condition of the joint substrate, and other conditions affecting joint-sealant performance.

3.2 PREPARATION

A. Removal of Failed Joint Sealant Materials: Cut out and remove joint materials and associated backing materials as indicated on drawings.

B. 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 an 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. 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

C. Joint Priming: Prime joint substrates where recommended by the joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

D. Masking Tape:

1. 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.
2. Use masking tape at fillet joints to maintain neat even lines on each side of the fillet.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless requirements that are more stringent 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 the kind indicated to support sealants during application and at the position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow the optimum capability for sealant movement.

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 a uniform, cross-sectional shapes and depths relative to joint widths that allow the optimum capability for sealant movement.

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 with approval in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.
4. Provide flush joint profile at locations indicated on Drawings according to Figure 8B in ASTM C 1193.
5. Provide recessed joint configuration of recess depth and at locations indicated on Drawings according to Figure 8C in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

G. Installation of Preformed, Foam Joint Seals:

1. Install each length of seal immediately after removing the protective wrapping.
2. Firmly secure compressed joint seals to joint gap side to obtain full bond using exposed pressure-sensitive adhesive or field-applied adhesive as recommended by the manufacturer.
3. Do not pull or stretch the material. Produce seal continuity at splices, ends, turns, and intersections of joints.
4. For applications at low ambient temperatures, heat the foam joint seal material in compliance with the manufacturer's written instructions.

3.4 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:

1. Extent of Testing: Test completed and cured sealant joints as follows:

    a. Perform one test per each floor per elevation for each kind of sealant and joint substrate.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:

a. Whether sealants filled joint cavities and are free of voids
b. Whether sealant dimensions and configurations comply with specified requirements
c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion complies with sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates of installations of sealants, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant material, sealant configuration, and sealant dimensions. Provide before and after photographs of tests.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

B. 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.

C. Inspection of installed sealants: Using a blunt instrument, depress the center of the sealant bead and note the cohesion of the sealant to the substrates. Remove sealants that separate from the substrate, correct the conditions creating the failure, and install new sealants.

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 the 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 the time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out, remove, and repair damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior and interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:

a. Joints between plant-precast architectural concrete units
b. Control and expansion joints in unit masonry
c. Joints of metal flashing
d. Joints between different materials listed above.
e. Perimeter joints between materials listed above and frames of windows and louvers.
f. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement

1. Joint Locations:

a. Control joints on exposed interior surfaces of exterior walls
b. Joints in gypsum board assemblies unless noted otherwise
c. Other joints as indicated on Drawings.

2. Joint Sealant: Acrylic Latex
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

C. Joint-Sealant Application: Concealed mastics

1. Joint Locations:

a. Metal to metal joints

1) Overlaps of sheet metal flashing
2) Crimped joints of sheet metal flashings

b. Other joints as indicated on Drawings.

2. Joint Sealant: Butyl-rubber based sealants and tapes
3. Joint-Sealant Color: Black or Gray

D. Joint Sealant Application: Exterior epoxy joints

1. Joint Locations:

a. Where indicated on drawings

2. Joint Sealant: Epoxy resin adhesive sealant
3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

E. Joint Sealant Application: Concealed exterior joints
   1. Joint Locations:

      a. Precast concrete panels
      b. Where indicated on drawings

   2. Joint Sealant: Preformed, Pre-Compressed, Self- Expanding Foam Joint Seals Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 08 11 13 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes steel doors and frames (hollow metal) indicated and as specified.

1.2 SUBMITTALS

A. Product Data: Submit complete printed data for each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.

B. Shop Drawings: Submit complete shop drawings; show the following:

1. Elevations of each door design.
2. Details of doors including vertical and horizontal edge details.
3. Frame details for each frame type including dimensioned profiles.
4. Details and locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, accessories, joints, and connections.
7. Coordination of glazing frames and stops with glass and glazing requirements.

C. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.

D. Oversize Construction Certificates: Submit certification for door assemblies required to be fire-protection rated and exceeding size limitations of labeled assemblies.

E. Thermal Performance Certification: For exterior door assemblies, submit certification required under “Quality Assurance” of this specification.

1.3 QUALITY ASSURANCE

A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.

B. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252.

1. Test Pressure: Test at atmospheric pressure.
2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
3. Temperature-Rise Rating: Where indicated in exit enclosures, provide doors that have a temperature-rise rating of 450 deg F (250 deg C) maximum in 30 minutes of fire exposure.

C. Thermal Performance: Provide exterior door assembly (door and frame) having a maximum U-factor of 0.700 as determined in accordance with NFRC 100 by a laboratory accredited by a naturally recognized accreditation organization such as the National Fenestration Rating Council and labeled and certified by the manufacturer or if not so labeled certified by the manufacturer to have a maximum U-factor of 0.50.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.

B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.

C. Store doors and frames at building site under cover. Place units on minimum 4 inch (100 mm) high wood blocking. Avoid using non-vented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4 inch (6 mm) spaces between stacked doors to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. Amweld Building Products, Inc.
2. Benchmark Commercial Doors; a division of General Products Co., Inc.
3. Ceco Door Products; a United Dominion Company.
4. Copco Door Co.
5. Curries Company.
6. Deansteel Manufacturing, Inc.
7. Kewanee Corporation (The).
8. Mesker Door, Inc.
9. Pioneer Industries Inc.
10. Republic Builders Products.
11. Steelcraft; a division of Ingersoll-Rand.

2.2 MATERIALS

A. Hot-Rolled Steel Sheets: ASTM A 569/A 569M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

B. Cold-Rolled Steel Sheets: ASTM A 366/A 366M, Commercial Steel (CS), or ASTM A 620/A 620M, Drawing Steel (DS), Type B; stretcher-leveled standard of flatness.

C. Metallic-Coated Steel Sheets: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with an A40 (ZF120) zinc-iron-alloy (galvannealed) coating; stretcher-leveled standard of flatness.

2.3 DOORS

A. General: Provide doors of sizes, thicknesses, and designs indicated.

B. Interior Doors: Provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Level 2 and Physical Performance Level B (Heavy Duty), Model 1 Full Flush except Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 1 (Full Flush) where stile and rail doors are shown

C. Exterior Doors: Provide insulated doors meeting thermal performance requirements specified in “performance requirements” of this specification and complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:

1. Level 3 and Physical Performance Level A (Extra heavy duty) Model 1. (Full flush).

2.4 FRAMES

A. General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.

B. Interior Frames: Fabricate frames of 0.053 inch (1.3 mm) thick steel sheet.

1. Where indicated, fabricate of stainless steel.

C. Exterior Frames: Fabricate frames of 0.067 inch (1.7 mm) thick metallic-coated steel sheet.

D. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.

E. Plaster Guards: Provide 0.016 inch (0.4 mm) thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.

F. Supports and Anchors: Fabricated from not less than 0.042 inch (1.0 mm) thick, electrolytic zinc-coated or metallic-coated steel sheet.

1. Wall Anchors in Masonry Construction: 0.177 inch (4.5 mm) diameter, steel wire complying with ASTM A 510 (ASTM A 510M) may be used in place of steel sheet.

G. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153/A 153M, Class C or D as applicable.

2.5 FABRICATION

A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, panels, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053 inch (1.3 mm) thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.

C. Interior Door Faces: Fabricate exposed faces of door from cold-rolled steel sheet.

D. Core Construction: Manufacturer's standard core construction that produces a door complying with SDI standards.

E. Core Construction: One of the following manufacturer's standard core materials that produce a door complying with SDI standards:

1. Resin-impregnated kraft/paper honeycomb.
2. Polyurethane where code compliant.
3. Polystyrene where code compliant
4. Vertical steel stiffeners.
5. Rigid mineral-fiber board.

F. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch (3.2 mm) at jambs and heads, except not more than 1/4 inch (6.4 mm) between pairs of doors. Not more than 3/4 inch (19 mm) at bottom.

G. Clearances for Fire-Rated Doors: As required by NFPA 80.

H. Single-Acting, Door-Edge Profile (strike jamb).

I. Double-Acting, Door-Edge Profile: Round vertical edges with 2-1/8 inch (54 mm) radius.

J. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."

K. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.

L. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.

M. Thermal-Rated (Insulating) Assemblies: At exterior locations and elsewhere as shown or scheduled, provide doors fabricated as thermal-insulating door and frame assemblies and tested according to ASTM C 236 or ASTM C 976 on fully operable door assemblies.

1. Unless otherwise indicated, provide thermal-rated assemblies with a maximum U-value of 0.500 or tested and certified in accordance with NFRC 100 for a maximum U-value of 0.700.

N. Sound-Rated (Acoustical) Assemblies: Where shown or scheduled, provide door and frame assemblies fabricated as sound-reducing type, tested according to ASTM E 1408, and classified according to ASTM E 413.

1. Unless otherwise indicated, provide acoustical assemblies with STC sound ratings of 33 or better.

O. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.

P. Frame Construction: Fabricate frames to shape shown.

1. Fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
2. For exterior applications, fabricate frames with mitered or coped and continuously welded corners and seamless face joints.
3. Provide welded frames with temporary spreader bars.

Q. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.

R. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.

S. Glazing Stops: Manufacturer's standard, formed from 0.032 inch (0.8 mm) thick steel sheet.

1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
2. Provide screw-applied, removable, glazing stops on inside of glass, louvers, and other panels in doors.
3. Coordinate stop location for the type and thickness of glazing required.

T. Astragals: As required by NFPA 80 to provide fire ratings indicated.

2.6 FINISHES

A. Prime Finish: Manufacturer's standard, factory-applied coat of rust-inhibiting primer complying with ANSI A250.10 for acceptance criteria.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install steel doors, frames, and accessories according to Shop Drawings, manufacturer's data, and as specified.

B. Placing Frames: Comply with provisions in SDI 105, unless otherwise indicated. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.

1. Except for frames located in existing walls or partitions, place frames before construction of enclosing walls and ceilings.

2. In masonry construction, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Acceptable anchors include masonry wire anchors and masonry T-shaped anchors.
3. In existing concrete or masonry construction, provide at least three completed opening anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Set frames and secure to adjacent construction with bolts and masonry anchorage devices.
4. In metal-stud partitions, provide at least three wall anchors per jamb; install adjacent to hinge location on hinge jamb and at corresponding heights on strike jamb. Attach wall anchors to studs with screws.
5. For in-place gypsum board partitions, install knock-down, drywall slip-on frames.
6. Install fire-rated frames according to NFPA 80.
7. For openings 90 inches (2286 mm) or more in height, install an additional anchor at hinge and strike jambs.

C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.

1. Fire-Rated Doors: Install within clearances specified in NFPA 80.
2. Smoke-Control Doors: Install to comply with NFPA 105.

3.2 ADJUSTING AND CLEANING

A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.

B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION 081113

SECTION 08 71 00 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes finish hardware as required and as specified.

1.2 SUBMITTALS

A. Product Data: Submit manufacturers technical product data for each item of hardware. Include whatever information may be necessary to show compliance with requirements, and include instructions for installation and for maintenance of operating parts and finish.

B. Hardware Schedule: Submit finish hardware schedule in a vertical format separate from door and frame schedule, conforming to "Sequence and Format for the Hardware Schedule" published by the Door and Hardware Institute (DHI). Horizontal and coded schedules are not acceptable.

1. Finish Hardware Schedule Content: Based on finish hardware indicated, organize hardware schedule into "hardware sets" indicating complete designations of every item required for each door or opening. Schedules not having the following information will be rejected:

a. Type, style, function, size and finish of each hardware item.
b. Name and manufacturer of each item.
c. Fastenings and other pertinent information.
d. Location of hardware set cross-referenced to indications on Drawings both on floor plans and in door and frame schedule.
e. Explanation of all abbreviations, symbols, codes, etc. contained in schedule.
f. Mounting locations for hardware.
g. Door and frame sizes and materials.

2. Submit schedule at earliest possible date, particularly where acceptance of hardware schedule must precede fabrication of other work (e.g., hollow metal frames) that is critical in the project construction schedule. Include with schedule the product data, samples, shop drawings of other work affected by finish hardware, and other information essential to the coordinated review of hardware schedule. Review and acceptance by the Owner or Architect does not relieve Contractor of responsibility to fulfill requirements of Contract Documents.

C. Samples: Prior to submittal of the final hardware schedule and prior to final ordering of finish hardware, submit one sample of each type of exposed hardware unit, finished as required, and tagged with full description for coordination with schedule.

1. Samples may be retrieved by the supplier. Units that are acceptable and remain undamaged through submittal, review and field comparison procedures may, after final check of operation, be used in the work, within limitations of keying coordination requirements.

D. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check shop drawings of such other work, to confirm that adequate provisions are made for proper location and installation of hardware.

E. Keying Schedule: Submit keying schedule after meeting with Owner's agent for keying instructions.

F. Electrified Hardware Coordination: Where electric strikes, magnetic locks, low energy door operators are listed, provide power supplies by the device manufacturer and wiring diagrams for all items, whether listed in the sets or not. Provide elevations of each system showing locations for each item and description of system operation. Coordinate with electric contractor.

1.3 QUALITY ASSURANCE

A. Manufacturer: Obtain each type of hardware (latch and lock sets, hinges, closers, etc.) from only one manufacturer, although several may be indicated as offering products complying with requirements.

B. Supplier: A recognized architectural finish hardware supplier, with warehousing facilities, who has been furnishing hardware in the project's vicinity for a period of not less than 2 years, and who is, or employs an experienced architectural hardware consultant who is available, at reasonable times during the course of the work, for consultation about project's hardware requirements, to Owner, Architect and Contractor.

C. Fire-Rated Openings: Provide hardware for fire-rated openings in compliance with NFPA Standard No. 80 and local building code requirements. Provide only hardware that has been tested and listed by UL or FM or WHI for types and sizes of doors required and complies with requirements of door and door frame labels.

1. Exit Devices: Where required on fire-rated doors (with supplementary marking on doors' UL, FM, or WHI labels indicating "Fire Door to be Equipped with Fire Exit Hardware") provide UL, FM, or WHI label on exit devices indicating "Fire Exit Hardware".
2. Fire exit devices and door closers shall be certified to be in compliance with UBC7.2 and UL 10C.

1.4 PREINSTALLATION CONFERENCE:

A. Conduct preconstruction conference at the project site.

B. Contractor shall notify hardware supplier two weeks prior to beginning of hardware installation to set up pre-installation meeting with installation carpenters. Hardware supplier shall provide a qualified Architectural Hardware Consultant to personally meet with, and instruct installers on job site in proper techniques for installation and adjustment of locks, closers and exit devices, and advise on required wire types and gauges for access control/electrical locking hardware.

1. Lock, Door Closer and Exit Device Manufacturer's representative shall be available for a post installation walk and punch list assistance on behalf of the General Contractor, Architect and Owner.
2. Review electrical roughing-in and preparatory work.
3. Review construction keying and final keying.

1.5 DELIVERY, STORAGE AND HANDLING

A. Tag each item or package separately, with identification related to final hardware schedule, and include basic installation instructions with each item or package.

B. Inventory hardware jointly with representatives of the hardware supplier and the hardware installer until each is satisfied that the count is correct.

C. Deliver individually packaged hardware items at the proper times to the proper locations (shop or project site) for installation.

D. Provide secure lock-up for hardware delivered to the project, but not yet installed. Control handling and installation of hardware items that are not immediately replaceable, so that completion of the work will not be delayed by hardware losses, both before and after installation.

PART 2 - PRODUCTS

2.1 SCHEDULED HARDWARE

A. Requirements for design, grade, function, finish, size and other distinctive qualities of each type of door hardware item is indicated in the Schedule of Hardware sets.

B. Manufacturer's Product Designations: A manufacturer's symbol in the hardware sets indicates whose product designation is used in the Schedule of Hardware Sets for purposes of establishing minimum requirements. Provide either the product designated, or, where more than one manufacturer is listed, the comparable product of one of the other manufacturers that comply with requirements including those specified elsewhere in this section.

C. ANSI/BHMA designations used elsewhere in this section or in schedules to describe hardware items or to define quality or function are derived from the following standards. Provide products complying with these standards and requirements specified elsewhere in this section.

1. Butts and Hinges: ANSI/BHMA A156.1.
2. Locks & Lock Trim: ANSI/BHMA A156.13.
3. Exit Devices: ANSI/BHMA A156.3.
4. Door Controls - Closers: ANSI/BHMA A156.4.
5. Auxiliary Locks: ANSI/BHMA A 156.5.
6. Architectural Door Trim: ANSI/BHMA A156.6.
7. Template Hinge Dimensions: ANSI//BHMA A156.7.
8. Door Controls - Overhead Holders: ANSI/BHMA A156.8.
9. Closer Holder Release Devices: ANSI/BHMA A156.15.
10. Auxiliary Hardware: ANSI//BHMA A156.16.
11. Materials & Finishes: ANSI/BHMA A156.18.
12. Power Assist and Low Energy Operated Door: ANSI/BHMA 156.19.
13. Thresholds: ANSI/BHMA A156.21.
14. Door Gasketing Systems: ANSI/BHMA A156.22.
15. Continuous Hinges: ANS/BHMA 156.26.

2.2 MATERIALS AND FABRICATION, GENERAL

A. Hand of door: Drawings show direction of slide, swing or hand of each door leaf. Furnish each item of hardware for proper installation and operation of door movement shown.

B. Manufacturer's Name Plate: Do not use manufacturer's products that have manufacturer's name or trade name displayed in a visible location (omit removable nameplates), except in conjunction with required UL labels and as otherwise acceptable to Architect.

C. Manufacturer's identification will be permitted on rim of lock cylinders, and armor front.

D. Base Metals: Produce hardware units of basic metal and forming method indicated, using manufacturer's standard metal alloy, composition, temper and hardness, but in no case of lesser quality than specified for the applicable hardware units by applicable ANSI A156 series standard for each type hardware and with ANSI A156.18 for finish designations indicated. Do not furnish "optional" materials or forming methods for those indicated, except as otherwise specified.

E. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware that has been prepared for self-tapping sheet metal screws, except as specifically indicated.

F. Furnish screws for installation, with each hardware item. Provide Phillips flat-head screws except as otherwise indicated. Finish exposed (exposed under any condition) screws to match hardware finish or, if exposed in surfaces of other work, to match finish of such other work as closely as possible, including "prepared for paint" in surfaces to receive painted finish.

G. Provide concealed fasteners for hardware units that are exposed when door is closed, except to extent no standard units of the type specified are available with concealed fasteners. Do not use thru-bolts for installation where bolt head or nut on the opposite face is exposed in other work, except where it is not feasible to adequately reinforce the work. In such cases, provide sleeves for each thru-bolt or use sex screw fasteners.

2.3 HARDWARE FINISHES

A. Provide matching finishes for hardware units at each door or opening, to the greatest extent possible, and except as otherwise indicated. Reduce differences in color and textures as much as commercially possible where the base metal or metal forming process is different for individual units of hardware exposed at the same door or opening. In general, match items to the manufacturer's standard finish for the latch and lock set (or push-pull units if no latch- lock sets) for color and texture.

B. Provide finishes that match those established by BHMA as indicated in the hardware schedule or, if none indicated, match the finish to which the item is applied.

C. Provide quality of finish, including thickness of plating or coating (if any), composition, hardness and other qualities complying with manufacturer's standards, but in no case less than specified for the applicable units of hardware by referenced standards.

D. Finish Designations: Scheduled designations refer to ANSI A156.18 "Materials & Finishes Standard", including coordination with the traditional U.S. finishes shown by certain manufacturers for their products.

2.4 HINGES, BUTTS

A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template- produced units.

B. Screws: Furnish Phillips flat-head or machine screws for installation of units, except furnish Phillips flat-head or wood screws for installation of units into wood. Finish screw heads to match surface of hinges or pivots.

C. Hinge Pins: Except as otherwise indicated in the hardware schedule, provide hinge pins as follows:

1. Material: Stainless steel pins.
2. Exterior Doors: Non-removable pins (NRP).
3. Interior Doors: Non-removable pins (NRP).
4. Tips: Flat button and matching plug, finished to match leaves.
5. Number of Hinges: Provide number of hinges indicated but not less than 3 hinges for door leaf for doors 90 inches or less in height and one additional hinge for each 30 inches of additional height.
6. All hinges shall be ball bearing type.
7. Provide safety stud and locking hole for hinges where scheduled.

D. Manufacturer, (Butts): Subject to compliance with requirements, provide products of one of the following:

1. Bommer Industries.
2. Hager Hinge Co.
3. Ives; Ingersoll-Rand Co.
4. McKinney Mfg. Co.; Assa Abloy Co.
5. PBB, Inc.
6. Stanley Hardware.

E. Manufacturer, (Geared Continuous Hinges): Provide products having UL listed units equal to or better than the rating of the opening of one of the following manufacturers:

1.	ABH, Inc.	4240HD series
2.	Hager/Roton	780-224-HD series
3.	Pemko	FMHD series
4.	Select Products	SL-24-HD series
5.	Stanley	520 series
6.	Zero	914DB series

2.5 LOCK CYLINDERS AND KEYING

A. General: Supplier shall meet with Owner to finalize keying requirements and obtain final instructions in writing. Comply with Owner’s instructions for master keying and except as

otherwise indicated, provide individual change key for each lock which is not designed to be keyed alike with a group of related locks.

B. Standard System: Except as otherwise indicated, provide new master key system for project. The following is standard system for keying hierarchy per CPS MASTER KEY ORGANIZATION.

1. Great grand master
2. Grand master: Principal and Building Engineer.
3. Sub Master for the following areas and conditions:

a. Exterior doors.
b. Special Rooms: Including rooms such auditorium, gymnasium and special use classrooms.
c. Single User Keys: Teacher's classroom key.

C. All cylinder cores shall be keyed at the factory by the cylinder manufacturer where records will be established and maintained.

D. All cylinders shall be not less than six (6) pin interchangeable core keyed to the existing (GHA generally uses "Best Lock;" contractor to verify) registered Grand master Key system.

E. Permanent keys shall be stamped with the key system symbol (VKC). Do not mark the keys with the cylinder biting. Permanent cores shall be marked with the key system symbol in such a manner that the mark is not visible when the core is installed in the cylinder (CVKC).

F. Except where otherwise specified, locksets, cylinders and cores shall be by the same manufacturer, to assure proper operations.

G. During construction, all cylinder cores shall be keyed alike. The Contractor shall receive three (3) copies of this key. Under no circumstances shall the Contractor receive any of the permanent building master keys or changes keys. The construction master key shall operate on no less than six (6) pins.

1. Quantity of Keys:

a. 3 Great Grand Master.
b. 3 Grand Master Keys.
c. 3 Master Keys.
d. 3 Keys per lock or cylinder.
e. 50 key blanks.
f. 3 Control keys.

H. Provide two key control systems, including envelopes, labels, tags with self locking key clips, receipt forms, 3-way visible card index, temporary markers and standard metal cabinet, all as recommended by system manufacturer with capacity for 150% of the number of locks required for the project.

1. The hardware supplier shall set up complete cross index system and place keys on markers and hooks in the cabinet as determined by the final key schedule.

I. Provide two hinges type wall mounted key cabinets for the above system to be installed as directed by the Owner.

2.6 LOCKS, LATCHES AND BOLTS

A. Strikes: Provide manufacturer's standard wrought box strike for each latch or lock bolt, with curved lip extended to protect frame, finished to match hardware set.

1. Foot Bolts: Provide dust-proof strikes, except where special threshold construction provides non-recessed strike for bolt.
2. Roller Strikes: Provide where recommended by manufacturer of the latch and lock units.

B. Mortise Locks:

1. Locks shall have all functions available in one size case, manufactured from heavy gauge steel, minimum thickness 3/32 inch, completely chrome plated for corrosion resistance and lubricity of parts. Cases shall be closed on all sides to protect internal parts. Locks shall have adjustable, beveled and armored fronts, secured with spanner head security screws. Standard 2-3/4 inch backset convertible from one function to another, with a full 3/4 inch throw two-piece, or approved one-piece anti-friction latch bolt and 1" throw dead bolt with hardened steel insert and available for a minimum door thickness of 1-3/4 inch. Internal parts shall be heavy gauge steel, zinc dichromate-plated and nickel steel hubs.
2. All locksets with latch bolts, regardless of trim, shall be listed by UL for A and lesser labeled doors, single or pairs.
3. Lock trim shall be solid stainless steel levers with wrought rose, through bolted through the lock case to assure correct alignment.
4. Lockset shall conform to, and be certified as meeting, ANSI A156.13 Grade 1 requirements.
5. Subject to compliance with specifications, provide one of the following:

a.	Best Lock; Stanley Works, Inc.	45H-14H series
b.	Corbin Russwin ; Assa Abloy Co.	ML2000 LSA series
c.	Dorma; Dorma Co.	ML9000 LTB Series
d.	Sargent; Assa Abloy Co.	8200 LNJseries
e.	Schlage;Ingersoll-Rand Co.	L9000-B03 series
f.	Yale Security; Assa Abloy Co.	CRR 8800FL series

C. Exit Devices:

1. Surface applied rim, mortise and vertical rod exit devices shall be available as a complete series, listed in UL "Accident Equipment List-Panic Hardware" and "Fire Exit Hardware". All devices shall be the modern push type. These devices shall have met Performance Test Requirements in accordance with ANSI Standard A156.3 for Grade 1 exit devices. All exit devices shall be furnished with thru-bolts and sex nuts. Provide cylinder dogging for all devices except “Fire Exit Devices”
2. Rim exit device for single doors and pairs of doors with fixed or removable mullions shall be equipped with one of the following type of latch bolts, deadlocking, guarded or square bolt with a minimum 3/4 inch throw.
3. All rim exit devices for pairs of doors with fixed or removable mullion shall have two-piece interlocking stabilizer blocks installed above and below the latch case.

4. Exit devices shall be the type, function, and design as listed in the schedule of finish hardware sets and shall have a manufacturer's warranty of five (5) years.
5. Removable Mullions:

    a. Constructed of 2 inch by 3 inch steel tubing prepared to receive the required strike plates.
    b. The top mounting shall be self-locking key removable type.
    c. Provide a wall mounted storage mount for each mullion by the same manufacturer.
    d. Provide stainless steel bottom floor fitting.
    e. Provide stabilizers above and below each exit device latch case.
    f. Provide factory applied paint finish conforming to ANSI/BHMA 689.

6. Subject to compliance with specifications, provide one of the following:

a.	Dorma; Dorma Co.	9000 Series
b.	Precision; Prevision Co.	Apex Series
c.	Sargent; Assa Abloy Co.	80 Series
d.	Yale Security; Assa Abloy Co.	7000 Series
e.	Von Duprin; Ingersoll-Rand Co.	98 Series

D. Multi-Point Lock: Three point lock.

1. Description: Three 1/2 inch x 1 inch solid steel bolts with 3/4 inch throw; 16 gauge galvanized steel case; 12 gauge plated steel strikes; 3 inch backset.
2. Function: Levers on both sides of lock. Turning lever retracts bolts in unison. Bolts are held retracted and are released when door closes.
3. Acceptable Product/Manufacturer: Lock 301C; Wm. J. Perkinson Co., Inc.

2.7 PUSH/PULL UNITS

A. Concealed Fasteners: Provide manufacturer's special concealed fastener system for installation; through-bolted for matched pairs, but not for single units. Pulls to have 2-1/2 inch clearance from face of the door to the underside of the pull.

B. Acceptable Manufacturers: Subject to compliance with requirements, provide products by the following:

1. Rockwood.
2. Hager.
3. Ives.
4. Trimco.
5. Hiawatha.
6. Von Duprin.

2.8 CLOSERS AND DOOR CONTROL DEVICES

A. Closers shall be rack and pinion construction with both rack and pinion of heat treated steel and with a cast iron or cast aluminum case. Closing the door will be controlled by 2 valves, one to control closing speed and one to control latching speed. Closers shall be regularly furnished with fully adjustable backcheck allowing approximate 70 degrees backcheck on both regular and parallel are closers. Delayed action shall be available. Valves shall be concealed against

unauthorized adjustment and non-critical needle valve type. Spring power adjustment shall be standard with an adjustment size 1 to size 6. Closers shall be surface applied with rectangular metal covers, void of manufacturers' trademarks. All door closers intended to be mounted to the door shall be furnished with thru-bolts and sex nuts.

B. Closers shall be certified as meeting the ANSI A156.4 Grade 1 requirements, be listed by UL for all classes of labeled doors and shall have a manufacturer’s warranty of ten (10) years.

C. Size of units: Except as otherwise specifically indicated, comply with the manufacturers recommendations for size of door control unit depending upon size of door, exposure to weather and anticipated frequency of use.

1. Provide heavy duty arms.
2. Provide spring cushion stops on parallel arm closers.
3. Provide heavy duty dead stop parallel arms on doors equipped with electric hold open/release devices.
4. Provide all necessary plates, brackets, arms and shoes required for proper installation of closer.

D. Acceptable Manufacturers:

1. Dorma 8900 Series.
2. LCN 4040 Series.
3. Norton 7500 Series.
4. Sargent 281 Series.

E. Door Holder/Release: Provide electric holder/release meeting the requirements of ANSI Standard A156.15.

1. Holder/release: Surface, wall-mounted
2. Door Armature: Cast aluminum furnished with Through-bolted and sex nuts with the projection required for wall and door conditions. Armatures requiring rod or tube extensions are not acceptable. Where required to make contact, provide shims of the same material and shape as the armature base.
3. Electric boxes, conduit and wiring to be provided under Division 26.
4. Voltage to be as required under Division 26.
5. Acceptable manufacturers:

a.	LCN	SEM7800 Series and SHE Series
b.	Sargent	1500 Series
c.	Rixson	900 Series

2.9 DOOR TRIM UNITS

A. Kick Plates, Mop Plates, Armor Plates: Stainless steel, 0.050 inch thick, beveled three sides.

B. Fasteners: Provide manufacturer's standard exposed fasteners for door trim units (kick plates, edge trim, viewers, knockers, mail drops and similar units); either machine screws or self-tapping screw.

C. Door protection plates shall be stainless steel 18-8 type 302, 0.050 inch thick, beveled three sides with vertical finish grain.

2.10 STOP AND HOLDERS

A. Provide wall mounted door stops and wall mounted door stop and holders as required to protect the wall and door lever.

1. Wall door stops: BHMA Type L52261.
2. Door Holders, Interior Doors: BHMA Type L1191.
3. Door Holders, Exterior doors: BHMA Type L11271.

B. Acceptable Manufacturers:

1. Rockwood Mfg. Co.
2. Hager.
3. Architectural Builders Hardware (ABH).
4. Trimco.
5. Ives.

2.11 THRESHOLDS, WEATHER SEALS AND RAIN DRIPS

A. Provide thresholds and weather seals on all exterior doors as scheduled.

B. Acceptable Manufacturers:

1. National Guard Products.
2. Pemko.
3. Hager.
4. Zero.
5. Reese.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mounting Locations: As indicated in "Recommended Locations for Builders Hardware for Standard Steel Doors and Frames" by the Door and Hardware Institute, and "ADA Accessibility Guidelines for Buildings and Facilities", except as specifically indicated or required to comply with governing regulations, and except as may be otherwise directed by Architect.

B. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage and reinstallation or application of surface protections with finishing work specified in the Division-9 sections. Do not install surface-mounted items until finishes have been completed on the substrate.

C. Install door hardware units using fasteners provided by the manufacturer as specified.

1. Hinges: Phillips flat head wood screws into wood Phillips flat head machine screws into metal.
2. Exit devices: Through bolts and sex nuts.
3. Closers Through bolts and sex nuts.
4. Door holder/release; armature mounted with through bolts and sex nuts.

D. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

E. Drill and countersink units that are not factory-prepared for anchorage fasteners. Space fasteners and anchors in accordance with industry standards.

F. Set thresholds for exterior doors in full bed of butyl- rubber or polyisobutylene mastic sealant. Thresholds shall be notched or coped to fit around removable mullions.

G. Removable mullion sill brackets shall be secured to the concrete floor with approved fasteners and anchors.

H. Hardware shall be installed with the fasteners and anchors provided by the manufacturer of that hardware item.

3.2 ADJUSTMENT, CLEANING AND KEYING

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Clean adjacent surfaces soiled by hardware installation.

C. Permanent cores and keys shall be delivered by the hardware supplier directly to the contractor at the keying meeting. The contractor and representative of the hardware supplier shall jointly install the permanent cores in the presence of the Owner’s agent who shall receive the keys. Hardware supplier shall return the construction cores and construction keys to the manufacturer.

D. Tools and instructions: At the time of keying the hardware supplier shall provide a complete set of specialized tools and maintenance instructions and shall instruct the Owner’s agent in the proper maintenance.

E. Final Adjustment: Wherever hardware installation is made more than one month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy, and make final check and adjustment of all hardware items in such space or area. Clean operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.

1. Instruct Owner's Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

3.3 SCHEDULE OF FINISH HARDWARE SETS

A. Provide finish hardware for each door to comply with requirements of this Section, hardware set numbers indicated on Door Schedule and the schedule of hardware sets on drawings.

B. Manufacturer's function and catalog numbers used in the hardware sets are identified by the following symbols.

1.	Hager Hinge Co.	HA
2.	Yale Security	Y
3.	LCN Closers	L
4.	Ives	I
5.	Rockwood Mfg. Co	R
6.	Architectural Builders Hardware Products	A
7.	Von Duprin	V
8.	Pemco	P
9.	Du Seung	D

C. Other Abbreviations:

1. LDW - Less Door Width
2. TBS - To Be Selected

3.4 FINISH HARDWARE SETS.

A. Hardware on the new door shall match as closely as possible the hardware (in new condition) that exists on the existing door to be removed & replaced. Following is a partial listing of hardware typically required on doors of this type. NOTE: This partial listing is provided for advisory/guidance purposes only. Owner and Architect will evaluate and determine acceptability of hardware submitted by the Contractor.

ITEM	MFG. MODEL NUMBER		MFG.	BHMA FINISH
HARDWARE SET # 1				
GEARED HINGES	780-224-HD SERIES		HA	TBS
EXIT DEVICE	CD98NL-2-697NL		V	630
STABILLIZER SETS	154		V	-----
CYLINDERS	AS REQUIRED		Y	626
DOOR CLOSER	4041H SPRING- CUSH		L	689
DOOR SCOPE	DS/2000		D	-----
ARMOR PLATE	32” X 2” LDW		R	630
THRESHOLD	626S 5”		HA	TBS
WEATHERSTRIP	2891-S	HEAD	P	TBS
WEATHERSTRIP	303-S	JAMBS	P	TBS
SWEEP	345-P		P	TBS
DRIP CAP	346		P	TBS

END OF SECTION 087100

SECTION 09 21 00 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Interior gypsum board
2. Thermal Insulation
3. Acoustical Sealant

B. Related Requirements:

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product

B. Samples: For the following products:

1. Trim Accessories: Full-size Sample in 12-inch long length for each trim accessory indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover, keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.5 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture-damaged, and mold-damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.

2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

2.3 INTERIOR GYPSUM BOARD

A. Gypsum Wallboard: ASTM C 1396/C 1396M

1. Acceptable manufactures:

    a. CertainTeed Corporation, 20 Moores Road, Malvern PA 1935
    b. Georgia-Pacific Gypsum LLC, 133 Peachtree Street, NE, P.O. Box 105605, Atlanta, GA 30303
    c. National Gypsum Company, 2001 Rexford Road, Charlotte NC 2821
    d. USG Corporation, 550 West Adams Street, Chicago IL 60661

2. Thickness: As indicated
3. Long Edges: Tapered

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.

1. Acceptable manufactures:

    a. CertainTeed Corporation, 20 Moores Road, Malvern PA 1935
    b. Georgia-Pacific Gypsum LLC, 133 Peachtree Street, NE, P.O. Box 105605, Atlanta, GA 30303
    c. National Gypsum Company, 2001 Rexford Road, Charlotte NC 2821
    d. USG Corporation, 550 West Adams Street, Chicago IL 60661

2. Thickness: 5/8 inch unless otherwise indicated
3. Long Edges: Tapered

C. Mold-Resistant Gypsum Board: ASTM C 1396/C 1396M, With moisture- and mold-resistant core and paper surfaces

1. Acceptable manufactures:

a. CertainTeed Corporation, 20 Moores Road, Malvern PA 1935
b. Georgia-Pacific Gypsum LLC, 133 Peachtree Street, NE, P.O. Box 105605, Atlanta, GA 30303
c. National Gypsum Company, 2001 Rexford Road, Charlotte NC 2821
d. USG Corporation, 550 West Adams Street, Chicago IL 60661

2. Core: Thickness as indicated Type X
3. Long Edges: Tapered
4. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.4 SPECIALTY GYPSUM BOARD

A. Gypsum Board, Type C: ASTM C 1396/C 1396M. Manufactured to have increased fire-resistive capability

1. Acceptable manufactures:

a. CertainTeed Corporation, 20 Moores Road, Malvern PA 1935
b. Georgia-Pacific Gypsum LLC, 133 Peachtree Street, NE, P.O. Box 105605, Atlanta, GA 30303
c. National Gypsum Company, 2001 Rexford Road, Charlotte NC 2821
d. USG Corporation, 550 West Adams Street, Chicago IL 60661

2. Thickness: As required by fire-resistance-rated assembly indicated on Drawings.
3. Long Edges: Tapered

2.5 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047

1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet

2. Shapes:

a. Cornerbead
b. L-Bead: L-shaped; exposed long flange receives the joint compound.
c. U-Bead: J-shaped; exposed short flange does not receive the joint compound.

2.6 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:

1. Interior Gypsum Board: Paper

C. Joint Compound for Interior Gypsum Board: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints**,** rounded or beveled panel edges**,** and damaged surface areas use the setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound

    a. Use setting-type compound for installing paper-faced metal trim accessories.

3. Fill Coat: For the second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat of Level 5 finish, use sandable topping, compound drying-type, all-purpose compound or high-build interior coating product designed for application by airless sprayer and used instead of the skim coat to produce Level 5 finish.

2.7 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to the continuous substrate.

C. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.

1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.

D. Sound-Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.

1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: Provide Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. The product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

1. Manufacturers and products

    a. AC-20 FTR: Pecora Corporation, 165 Wambold Road, Harleysville PA 19438
    b. USG Sheetrock Brand Firecode Smoke-Sound Sealant: USG Corporation, 550 West Adams Street, Chicago IL 60661
    c. GSCSF Acoustical Sealant LEED Letter Technical DataGrabber Construction: Products, 20 West Main Street CT STE 200, Alpine UT 84004

F. Thermal Insulation: Glass-Fiber Blanket, Unfaced: ASTM C 665, Type I; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion characteristics.

1. Acceptable manufactures:

a. CertainTeed Corporation, 20 Moores Road, Malvern PA 1935
b. Knauf Insulation, One Knauf Drive, Shelbyville IN 46176
c. Owens Corning, One Owens Corning Parkway, Toledo OH 43659

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting the performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Proceed with installation only after completing corrections unsatisfactory conditions.

3.2 APPLYING AND FINISHING PANELS, GENERAL

A. Comply with ASTM C 840.

B. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

C. Locate edge and end joints over supports. Do not place tapered edges against cut edges or ends.

D. Cover both faces of support framing with gypsum panels in concealed spaces.

1. Unless the concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in the area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below the underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members, allow 1/4- to 3/8-inch wide joints to install sealant.

E. Install sound attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 APPLYING INTERIOR GYPSUM BOARD

A. Install interior gypsum board in the following locations:

1. Wallboard Type: As indicated on Drawings or match existing
2. Type X: Where required for fire-resistance-rated assembly
3. Mold-Resistant Type: As indicated on Drawings.
4. Type C: Where required for specific fire-resistance-rated assembly indicated

B. Single-Layer Application:

1. On partitions/walls, apply gypsum panels vertically (parallel to framing unless otherwise indicated or required by the fire-resistance-rated assembly, and minimize end joints.

    a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
2. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

C. Multilayer Application:

1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by the fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
2. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

3.4 INSTALLING TRIM ACCESSORIES

A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.

B. Interior Trim: Install in the following locations:

1. Cornerbead: Use at outside corners unless otherwise indicated
2. L-Bead: Use where indicated
3. U-Bead: Use at exposed panel edges

3.5 FINISHING GYPSUM BOARD

A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

B. Prefill open joints and damaged surface areas.

C. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:

1. Level 1: Ceiling plenum areas, concealed areas, and where indicated
2. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated

    a. For primer and its application to surfaces, refer to Section 099123 "Interior Painting."

3.6 PROTECTION

A. Protect adjacent surfaces from drywall compound and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during the remainder of the construction period.

C. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 21 00

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes requirements for field priming and painting of exposed items and surfaces.

1. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.

B. Paint exposed surfaces, except where the paint schedules or these Specifications indicate that a surface or material is not to be painted. If the paint schedule does not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.

1. Painting includes field painting of exposed ducts, pipes, conduits (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment that do not have a factory-applied final finish.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.

1. Prefinished items include, but are not limited to, the following factory-finished components:

a. Architectural woodwork.
b. Metal lockers.
c. Elevator equipment.
d. Finished mechanical and electrical equipment.
e. Light fixtures and supports.

2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:

a. Furred areas.
b. Ceiling plenums.
c. Pipe spaces.
d. Duct shafts.
e. Elevator shafts (if any).

3. Finished metal surfaces include, but are not limited to, the following:

a. Anodized aluminum.
b. Stainless steel.
c. Chromium plating.

4. Operating parts include moving parts of operating equipment and the following:

a. Valve and damper operators.

b. Linkages.
c. Sensing devices.
d. Motor and fan shafts.

5. Labels: Do not paint over:

a. UL, FMG, or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
b. Labels designating materials or assemblies as accessible.

1.2 DEFINITIONS

A. General: Standard coating terms defined in ASTM D 16 apply to this Section.

B. Gloss ranges used in this Section include the following:

1. Flat refers to a lusterless or matte finish with a gloss range below 5 when measured at a 60-degree meter.
2. Eggshell refers to low-sheen finish with a gloss range between 5 and 10 when measured at a 60-degree meter.
3. Satin refers to low-sheen finish with a gloss range between 10 and 35 when measured at a 60-degree meter.
4. Semi-gloss refers to medium-sheen finish with a gloss range between 35 and 70 when measured at a 60-degree meter.
5. Full gloss refers to high-sheen finish with a gloss range more than 70 when measured at a 60-degree meter.

C. Concealed: Refers to surfaces, materials, assemblies, or items that cannot be accessed without moving a building element, such as within a chase, wall, or ceiling cavity.

D. Exposed: Refers to any item or surface that is not concealed.

1. Exposed to Public View: Refers to items situated so they can be seen from eye level from a public location. A public location is that which is accessible to persons not responsible for operation or maintenance of the building.

1.3 SUBMITTALS

A. Product Data: For each type of product, including block fillers and primers. Include preparation requirements and application instructions.

1. For paints and coatings, include documentation indicating that they meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Samples:

1. Initial Selection: Submit manufacturer's color charts illustrating their full range of available colors for each type of product and finish required for the Project.

a. Confirm availability of colors specified by Architect with the manufacturer and notify the Architect in writing if any discrepancies, including lack of availability, should occur.

2. Verification: Submit three (3) draw-downs of each type of product, sheen, and color specified or scheduled in Drawings. Draw-downs shall be prepared on hardboard, not less than 12-inches square.

a. Each sample shall be labeled with the following:

1) Project name and number.
2) Date.
3) Manufacturer's name.
4) Installer's name.
5) Product name.
6) Product number.
7) Color name and number as stated in the color schedule.
8) Name, address, and phone number of the supplying facility.

b. Provide stepped Samples, defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.

c. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application (e.g. "classroom ceiling").

C. Qualification Data: When requested, submit qualification data for firms and persons specified in the "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

1.4 REGULATORY REQUIREMENTS

A. Comply with all applicable regulations of authorities having jurisdiction.

1.5 QUALITY ASSURANCE

A. Applicator Qualifications: Engage an experience applicator who has completed painting system application similar in material, design, and extent to that indicated for the Project, and whose work has resulted in applications with a record of successful in-service performance.

A. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.

B. Benchmark Samples (Mockups): Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.

1. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted.
2. After permanent lighting and other environmental services have been activated, apply coatings in this room or to each surface according to the Schedule or as specified. Provide required sheen, color, and texture on each surface.

a. After finishes are accepted, the Architect will use the room to evaluate coating systems of a similar nature.

3. Final approval of colors will be from job-applied samples.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:

1. Product name or title of material.
2. Product description (generic classification or binder type).
3. Manufacturer's stock number and date of manufacture.
4. Contents by volume, for pigment and vehicle constituents.
5. Thinning instructions.
6. Application instructions.
7. Color name and number.
8. VOC content.

B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.

1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

1.7 PROJECT CONDITIONS

A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F and 90 deg F.

A. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 deg F and 90 deg F.

B. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

C. Do not apply paint in areas where dust is being generated or will be generated while the applied paint is drying.

D. In rooms and spaces where paint is being applied, ensure there is adequate ventilation to allow for proper paint drying, as well as to exhaust paint fumes and minimize odors.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, provide products from one of the following:

1. Benjamin Moore & Co. (BM).
2. Pittsburgh Paints, PPG Industries, Inc. (PPG).
3. The Sherwin-Williams Company (SW).
4. Tnemec Company, Inc. (Tnemec).

2.2 PAINT MATERIALS, GENERAL

A. Material Compatibility: 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. 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.

1. Proprietary Names: Use of manufacturer's proprietary product names to designate colors or materials is not intended to imply that products named are required to be used to the exclusion of equivalent products of other manufacturers.

B. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (IPA Method 24).

1. Flat Paints and Coating: 50-g/l.
2. Non-Flat Paints and Coatings: 150-g/l.
3. Dry-Fog Coatings: 400-g/l.
4. Primers, Sealers, and Undercoaters: 200-g/l.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250-g/l.
6. Zinc-Rich Industrial Maintenance Primers: 340-g/l.
7. Pretreatment Wash Primers: 420-g/l.
8. Floor Coatings: 100-g/l.
9. Shellacs, Clear: 730-g/l.
10. Shellacs, Pigmented: 550-g/l.

C. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Colors: Provide color selections made by the Architect and selected from manufacturer's full range.

E. Paint Systems: The paint systems specified are intended to comply with the VOC and chemical component limits of Green Seal Standard for Paints and Coatings GS-11 (interior non-clear systems). When the paint manufacturer produces a product that improves upon those of the specified product, provide the improved product. It is the intent that all components of the

systems individually (primer/sealer, undercoat, top coat) comply. Provide products that comply to the extent available or prepare a budget that will ensure compliance on a project wide basis.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.

1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total system for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.

1. Notify the Architect in writing about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION

A. General:

1. Test existing plaster substrates indicated to be painted (walls and ceilings) for presence of calcimine coating and/or lack of adhesion of existing layers of previously applied paint materials. Where tests return positive results, prepare substrates, including removal of existing layers of previously applied paint materials as required or recommended by paint manufacturer to provide sound substrates, suitable and acceptable to paint manufacturer for application of their products.
2. Remove hardware and hardware accessories, stainless steel plates, machined surfaces, lighting fixtures, wire guards, screens, grilles and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before preparation and painting of scheduled materials.
3. Remove and paint behind pictures, signs, shades, furniture, cabinets and similar items that are not secured to walls.
4. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved and remove surface-applied protection from unpainted objects.

A. Protection: In each area to be painted, cover and protect adjacent surfaces and materials, furniture, equipment, and floors from overspray, splatter, and other damage with clean cloths, heavy building paper, or clean plastic sheeting secured in place. All protection shall be carefully removed when painting operations are complete.

B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.

1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.

C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.

1. Provide barrier coats over incompatible primers or remove and reprime.
2. Cementitious Materials: Prepare concrete, concrete masonry units, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.

    a. Use low dust emission wet methods to prepare the surface as recommended by the paint manufacturer.
    b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds level recommended by manufacturer for successful application of their product(s).
    c. Clean concrete floors to be painted with a 5percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to thoroughly dry, and vacuum before painting.

3. Wood: Clean surfaces of dirt, oil, and other foreign substances with scrapers, mineral spirits, and sandpaper,. Sand surfaces exposed to view smooth and remove dust.

    a. Scrape and clean small, dry, seasoned knots, and apply a thin coat of white shellac or other recommended knot sealer before applying primer. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler. Sand smooth when using low dust emission, wet method and when dried.

4. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances in accordance with SSPS-SP1 "Solvent Cleaning." After solvent cleaning, prepare any bare metal surfaces by removing all stratified rust (rust scale), all loose mill scale, all loose or non-adherent rust, and detrimental welding deposits by methods specified in SSPC-SP3 "Power Tool Cleaning."

    a. Touch up bare areas and shop-applied prime coats that have been damaged. Wirebrush, clean with solvents recommended by paint manufacturer and spot prime with rust-inhibitive metal primer recommended by the topcoat manufacturer.
    b. Primer coats should be applied without delay, before rust reappears, with rust inhibitive primer.

5. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents in accordance with SSPC-SP1 "Solvent Cleaning." Remove grease and oil residue by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of applied paint products.

    a. Weathered, unpainted galvanized metal surfaces shall be wire brushed or power washed to remove deposits of white zinc corrosion, then primed with a metal primer

according to recommendations of the topcoat manufacturer. Rusted areas shall be sanded clean, and spot primed with a metal primer, then coated overall with same according to recommendations of topcoat manufacturer.

b. Peeling and scaling paint and chalk must be removed by scraping, sanding and wirebrushing. Rusted and abraded surfaces must be cleaned by scraping, sanding, and wirebrushing, then primed, without delay, with an acrylic latex metal primer.

c. For newly installed surfaces and materials that have been hot-dipped galvanized, allow not less than 6-months of weathering prior to cleaning. Clean surfaces according to recommendations of topcoat manufacturer. Immediately before painting, roughen surface with coarse sandpaper, exercising care to not damage the zinc galvanizing, and wipe clean.

D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.

1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
2. Stir material before application, and during application as required, to produce and maintain a mixture of uniform density. Do not stir any surface film that may form into material. Remove surface film and strain material before using.
3. Use only thinners approved by paint manufacturer and only within recommended limits.

3.3 APPLICATION

A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.

1. No Work shall be performed:

   a. Where cement or plaster is being applied or is in the process of drying.
   b. In spaces that are not broom clean and free of dust and waste.

2. Paint colors, surface treatments, and finishes are indicated in the schedules.
3. Apply paint materials to produce smooth finished surfaces, free of brush or roller marks, holidays, drops, runs, or sags.
4. Apply first or prime coat with brush or roller; work well into surface.
5. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
6. Provide finish coats that are compatible with primers used.
7. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
8. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of permanently fixed equipment or furniture, paint surfaces behind such equipment or furniture with prime coat only.
9. Paint interior surfaces of ducts with a flat, non-specular black paint where visible through registers or grilles.
10. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
11. Paint access panels, electrical panels, air diffusing outlets, supply and exhaust grilles, louvers, exposed conduit, primed hardware items, primed outlet covers, primed wall and

ceiling plates and other items in painted areas to match the areas in which they occur unless otherwise directed by the Architect.

8. Finish doors on tops, bottoms, and side edges the same as exterior faces.
9. Sand lightly using low-dust emission wet methods between each succeeding enamel or varnish coat.

B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.

1. The number of coats and the film thickness required are the same regardless of application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. If sanding is required to produce a smooth, even surface according to manufacturer's written instructions, sand between applications.
2. Omit primer on metal surfaces that have been shop primed and touchup painted.
3. If undercoats, stains, or other conditions show through final coat of paint, apply additional coats until paint film is of uniform finish, color, and appearance. Give special attention to ensure edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.
4. Allow sufficient time between successive coats to permit proper drying according to manufacturer's recommendations to ensure application of subsequent coat(s) of paint does not cause undercoat to lift or lose adhesion.

C. Application Procedures: Apply paints and coatings by brush, roller, spray, or other applicators according to manufacturer's written instructions.

1. Brushes: Use brushes best suited for the type of material applied. Use brush of appropriate size for the surface or item being painted.
2. Rollers: Use rollers of carpet, velvet back, or high-pile sheep's wool as recommended by the manufacturer for the type of material and finish texture required.
3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the type of material and finish texture required.

D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness (DFT) of the entire system as defined in these specifications and as recommended by the manufacturer (whichever is greater).

E. Mechanical and Electrical Equipment, Devices, and Accessories: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.

1. Mechanical items to be painted include, but are not limited to, the following:

    a. Uninsulated metal piping.
    b. Pipe hangers, and supports.
    c. Heat exchangers.
    d. Tanks.
    e. Ductwork.
    f. Insulation.
    g. Motors and mechanical equipment.
    h. Supports.
    i. Accessory items.
    j. Mechanical equipment indicated to have factory-primed finish for field painting.

F. Electrical items to be painted include, but are not limited to, the following:

1. Conduit and fittings.
2. Switchgear.
3. Panelboards.
4. Electrical equipment indicated to have factory-primed finish for field painting.

G. Block Fillers: Apply block fillers to concrete masonry units at a rate to ensure complete coverage with pores filled.

H. Prime Coats: Before applying finish coats, apply a prime coat, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn-through or other defects due to insufficient sealing.

I. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.

3.4 FIELD QUALITY CONTROL

A. The Owner reserves the right to invoke the following test procedure at any time and as often as the Owner deems necessary during the period when paint is being applied:

1. The Owner will engage the services of an independent testing agency to sample the paint material being used. Samples of material delivered to the Project will be taken, identified, sealed, and certified in the presence of the Contractor.
2. The Owner may direct the Contractor to stop painting if test results show material being used does not comply with specified requirements. The Contractor shall remove non-complying paint from the site, pay for testing, and repaint surfaces previously coated with the rejected paint. If necessary, the Contractor may be required to remove rejected paint from previously painted surfaces if, on repainting with specified paint, the two coatings are incompatible.

3.5 CLEANING

A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site and dispose of legally.

1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping without scratching or damaging adjacent finished surfaces.

B. The testing agency will perform on site and laboratory tests for the following characteristics as required by the Board Authorized Representative:

1. Adhesion Tests: ASTM D 3359 and ASTM D 6677.
2. Film thickness tests.

3. Quantitative materials analysis.
4. Apparent reflectivity.
5. Washability.
6. Dry Capacity.

3.6 PROTECTION

A. Confine dust and odor emissions by using low-dust wet methods. If this is insufficient, the contractor must use barriers, containment and HEPA filtered negative air equipment to limit migration of dust and odors beyond the work areas.

B. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.

C. Provide "Wet Paint" signs to warn occupants of and to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.

1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA P1.

3.7 EXTERIOR PAINT SCHEDULE

A. Ferrous Metal: Provide the following finish systems over exterior ferrous metal. Primer is not required on shop-primed items. Spot prime damaged shop-primed surfaces.

1. Semi-gloss, Acrylic-Enamel Finish: 2 finish coats over a rust-inhibitive primer.

a. Primer: Rust-inhibitive metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.

1) BM: Super Spec HP D.T.M. Acrylic Semi-Gloss P29.
2) PPG: 6-208 Speedhide Alkyd Primer.
3) SW: DTM Primer B66W1.
4) Tnemec: Series V10 Tnemec Primer.

b. First and Second Coats: Semi-gloss, exterior, acrylic-latex enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils.

1) BM: Super Spec HP D.T.M. Acrylic Semi-Gloss P29.
2) PPG: 7-series Industrial Gloss Enamel.
3) SW: DTM Acrylic Semi-Gloss B66W200 Series.
4) Tnemec: Series 1029 Enduratone.

3.8 INTERIOR PAINT SCHEDULE

A. Concrete and Masonry (Other than Concrete Masonry Units): Provide the following paint systems over interior concrete and brick masonry surfaces:

1. Semi-Gloss, Acrylic-Enamel Finish: 2 finish coats over a primer.

a. Primer: Alkali-resistant, acrylic-latex, interior primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.0 mil.

1) BM: MoorCraft Super Spec Latex Enamel Undercoater & Primer Sealer #253.
2) PPG: 6-603 Speedhide Interior/Exterior Acrylic Latex Alkali Resistant Primer .
3) SW: PrepRite Masonry Primer B28W300.
4) Tnemec: Series 151 Elasto-Grip FC.

b. First and Second Coats: Semi-gloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils.

1) BM: MoorCraft Super Spec Latex Semi-Gloss Enamel #276.
2) PPG: 6-500 Speedhide Interior Semi-Gloss Acrylic Latex.
3) SW: ProMar 200 Latex Semi-Gloss B31W200 series.
4) Tnemec: Series 1029 Enduratone.

B. Concrete Masonry Units: Provide the following finish systems over interior concrete masonry units:

1. Semi-gloss, Acrylic-Enamel Finish: 2 finish coats over a block filler.

a. Block Filler: High-performance, latex-based, block filler applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 5.0 mils.

1) BM: Super Spec Hi-Build Block Filler #206.
2) PPG: Speedhide Interior/Exterior Latex Block Filler 6-7.
3) SW: PrepRite Block Filler B25W25.
4) Tnemec: Series 54 Masonry Filler.

b. First and Second Coats: Semi-gloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 2.6 mils.

1) BM: Super Spec Interior Latex Eggshell Finish #274.
2) PPG: Speedhide Interior Latex Eggshell 6-411.
3) SW: ProMar 200 Latex Semi-Gloss B31W200.
4) Tnemec: Series 1029 Enduratone.

C. Ferrous Metal (except as specified above): Provide the following finish systems over ferrous metal:

1. Semi-gloss, Acrylic-Enamel Finish: One finish coat over an enamel undercoater over a primer.

a. Primer: Quick-drying, rust-inhibitive, metal primer, as recommended by the manufacturer for this substrate, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils.

1) BM: M04 Acrylic Metal Primer.
2) PPG: Pitt-Tech 90-712 DTM primer.
3) SW: DTM Primer B66W1.
4) Tnemec: Series V10 Tnemec Primer.

b. First and Second Finish Coats: Semi-gloss, acrylic-latex, interior enamel applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.3 mils.

1) BM: IronClad Latex Low Lustre Metal & Wood Enamel #363.
2) PPG: Pure Performance 9-510 Series 6-411.
3) SW: ProClassic W/B Acrylic Semi-Gloss B31W200 Series.
4) Tnemec: Series 1029 Enduratone.

END OF SECTION 099100