



SEALEY ELEMENTARY SCHOOL ROOF REPLACEMENT

TALLAHASSEE, FLORIDA

LEON COUNTY SCHOOLS

CONSTRUCTION DOCUMENTS

MAY 17, 2022

ARCHITECTURE - INTERIOR DESIGN - BUILDING ENVELOPE

SEALEY ELEMENTARY SCHOOL ROOF REPLACEMENT
LEON COUNTY SCHOOLS
TALLAHASSEE, FLORIDA
PROJECT NUMBER – 156122

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SECTION 01 11 00 - SUMMARY OF THE WORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification sections, apply to work of this section.

1.2 PROJECT/WORK IDENTIFICATION:

- A. General: Project name is Sealey Elementary School Buildings 1, 2, 3, 4, & 5's Roof Replacement, City of Tallahassee, in Tallahassee Florida as shown on the Contract Documents prepared by MLD Architects, LLC. 211 John Knox Road, Suite 105, Tallahassee, Florida, 32303 (1-850-385-9200).
- B. Contract Documents: Indicate the work of the Contract and related requirements and conditions that have an impact on the project.
- C. Summary of References: Work of the Contract can be summarized by references to the Contract, General Conditions, Supplementary Conditions, Specification Sections, Drawings, addenda and modifications to the contract documents issued subsequent to the initial printing of this project manual and including but not necessarily limited to printed material referenced by any of these. It is recognized that work of the contract is also unavoidably affected or influenced by governing regulations, natural phenomenon including weather conditions and other forces outside the contract documents.
- D. Abbreviated Written Summary: Briefly and without force and effect upon the contract documents, the work of the Contract can be summarized as follows:

The work includes the removal of buildings 1, 2, 3, 4, & 5's existing roofing and flashing systems down to the existing lightweight concrete deck on the structural steel deck, and install a reinforced nailed base sheet and a temporary membrane/vapor barrier over the repaired and clean lightweight deck, install 1/4" per foot tapered rigid isocyanurate insulation system with a 1/2" high density coverboard and install a hybrid reinforced modified bitumen membrane interply roofing membrane with a high solar reflectance index (SRI), fully adhered 60 mil Ketone Ethylene Ester (KEE) fleece backed cap sheet roofing and 60 mil KEE flashing membrane system. The work also includes installing new cast iron roof drains with metal basket strainers, raising expansion joints between roof sections, raising perimeter edges, removing abandoned rooftop equipment and raising existing curbed rooftop equipment and VTRs a minimum ten inches above the finished roof surface.

ALTERNATE #A:

In lieu of installing the "hybrid" KEE roofing system, install a "hybrid" reinforced SBS modified bitumen membrane interply roofing membrane with 80 mil PVC single ply roofing system with 60 mil flashings to meet FBC and provide manufacturer's 20 year NDL (edge to edge) warranty.

1.3 CONTRACTOR USE OF PREMISES:

- A. General: The Contractor shall limit his use of the premises to the work indicated, to allow for Owner occupancy and operations of adjacent property.
- B. Use of the Site: Confine operations at the site to the areas permitted under the Contract. Portions of the site beyond areas on which work is indicated are not to be disturbed. Conform to site rules and regulations affecting the work while engaged in project construction.
 - 1. Keep existing driveways and entrances serving the premises clear and available to the Owner and his employees, at all times. Do not use these areas for parking or storage of materials.
 - 2. Do not unreasonably encumber the site with materials or equipment. Confine stockpiling of materials and location of storage sheds to the areas agreed upon. If additional storage is necessary, obtain and pay for such storage off site.
 - 3. Lock automotive type vehicles, such as passenger cars and trucks and other mechanized or motorized construction equipment, when parked and unattended, to prevent unauthorized use. Do not leave such vehicles or equipment unattended with the motor running or the ignition key in place.

1.4 OWNER OCCUPANCY:

- A. Full Owner Occupancy: The Owner will occupy the adjacent operation areas and facilities, on the site. Cooperate fully with the Owner or his representative during construction operations to minimize conflicts, maintain safe conditions and to facilitate Owner usage. Perform the work so as not to interfere with the Owner's operations.

1.5 ALTERATIONS AND COORDINATION:

- A. General: The work of this Contract includes coordination of the entire work of the project, including preparation of general coordination drawings, diagrams and schedules, and control of site utilization, from beginning of construction activity through project close-out and warranty periods.
- B. Alterations: Where applicable, requirements of the contract documents apply to alteration work in the same manner as to new construction.
- C. All work shall comply with the Florida Building Code Seventh Edition 2020

1.6 MISCELLANEOUS PROVISIONS:

- A. Mechanical/Electrical Requirements of General Work:
 - 1. General: Except as otherwise indicated, comply with applicable requirements of Division-23 sections for mechanical provisions within units of general (Division 2-14) Work. Except as otherwise indicated, comply with applicable requirements of Division-26 sections for electrical

provisions within units of general (Division 2-14) Work.

2. Service Connections: Refer to Division-23 and Division-26 sections for the characteristics of the mechanical and electrical services to be connected to units of general work. Provide units manufactured or fabricated for proper connection to and utilizations of available services, as indicated. Except as otherwise indicated, final connection of mechanical services to general work is defined as being mechanical work, and final connection of electrical services to general work is defined as electrical work.
 3. Plumbing, sewer and water tap fees shall be paid by the Contractor.
 4. Electrical Requirements: Except as otherwise indicated, comply with applicable provisions of 2020 National Electric Code for electrical components of general work. Provide Underwriters Laboratories listed and labeled products where applicable.
 - a. Unless otherwise indicated electrical components for general work shall comply with the items and work listed in Specification Division 26 and other areas of the Specifications.
- B. Performance Requirements for Completed Work:
1. General: The Contract Documents indicated the intended occupancy and utilization of the building and its individual systems and facilities. Compliance with governing regulations is intended and required for the work and for the Owner's occupancy and utilization.

END OF SECTION 01 11 00

SECTION 01 14 16 – COORDINATION WITH OCCUPANTS

A. Contractor shall notify owner, in writing, two (2) work days in advance of any work starting on the property.

B. Any issues arising due to scheduling or access to work site shall be reported promptly to the Architect and Owner's Representative for resolution.

END OF SECTION 01 14 16

SECTION 01 22 00 - UNIT PRICES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for unit prices.
- B. Related Sections include the following:
 - 1. Division 1 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.3 DEFINITIONS

- A. Unit price is an amount proposed by bidders, stated on the Bid Form, as a price per unit of measurement for materials or services added to or deducted from the Contract Sum by appropriate modification, if estimated quantities of Work required by the Contract Documents are increased or decreased.

1.4 PROCEDURES

- A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: Refer to individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.
- D. List of Unit Prices: A list of unit prices is included in Part 3. Specification Sections referenced in the schedule contain requirements for materials described under each unit price.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 LIST OF UNIT PRICES

A. Unit Price No. 1 – Lightweight Insulating Concrete:

1. Description: Lightweight Insulating Concrete according to Construction Drawings
2. Base bid to include 5,000 sf Lightweight Insulating Concrete. Contractor to provide additive/deductive square foot unit cost (\$_/sf) for additional Lightweight Insulating Concrete.

B. Unit Price No. 2 – Walk Treads

1. Description : Manufactures walk tread protective membrane with manufacturers recommended spacing and anchoring.
2. Base bid to include 600 sf (3'x6' pads). Contractor to provide additive/deductive square foot unit cost (\$_/sf) for additional walk treads installed.

END OF SECTION 01 22 00

SECTION 01 33 00 – SUBMITTALS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including;
 - 1. Contractor's construction schedule.
 - 2. Submittal schedule.
 - 3. Daily construction reports and drawings.
 - 4. Shop Drawings.
 - 5. Product Data.
 - 6. Samples.
- B. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:
 - 1. Special prequalification requirements.
 - 2. Applications for payment.
 - 3. Performance and payment bonds.
 - 4. Insurance certificates.
 - 5. List of Subcontractors.
- C. Inspection and test reports are included in Section "Quality Control Services."

1.3 SUBMITTAL PROCEDURES

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.
 - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.
 - 2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.
 - 3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.
- B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Project name, and building reference.
 2. Date.
 3. Name and address of Architect.
 4. Name and address of Contractor.
 5. Name and address of subcontractor.
 6. Name and address of supplier.
 7. Name of manufacturer.
 8. Number and title of appropriate Specification Section.
 9. Drawing number and detail references, as appropriate.
- C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Architect using a transmittal form. Submittals received from sources other than the Contractor will be returned without action.
1. On the transmittal Record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitations. Include Contractor's certification that information complies with Contract Document requirements.

1.4 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Bar-Chart Schedule: Prepare a fully developed, horizontal bar- chart type Contractor's construction schedule. Submit within 30 days of the date established for "Commencement of the Work".
1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the Work as indicated in the "Schedule of Values".
 2. Within each time bar indicate estimated completion percentage in 10 percent increments. As Work progresses, place a contrasting mark in each bar to indicate Actual Completion.
 3. Prepare the schedule on a sheet, or series of sheets, of stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.
 4. Secure time commitments for performing critical elements of the Work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the Work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the Work.
 5. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment requests and other schedules.
 6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.
- B. Work Stages: Indicate important stages of construction for each major portion of the Work, including testing and installation.

- C. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the Work. Indicate where each element in an area must be sequenced or integrated with other activities.
- D. Cost Correlation: At the head of the schedule, provide a two-item cost correlation line, indicating "pre-calculated" and "actual" costs. On the line show dollar-volume of Work performed as of the dates used for preparation of payment requests.
- E. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the Project meeting room and temporary field office.
 - 1. When revisions are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.
- F. Schedule Updating: Revise the schedule after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.5 SUBMITTAL SCHEDULE

- A. After development and acceptance of the Contractor's construction schedule, prepare a complete schedule of submittals. Submit the schedule within 10 days of the date required for establishment of the Contractor's construction schedule.

1.6 DAILY CONSTRUCTION REPORTS

- A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Architect at weekly intervals:
 - 1. Work completed this date.
 - 2. Area of work.
 - 3. Products used, number of gallons, square feet covered, coverage rate, etc.
 - 4. Approximate count of personnel at the site.
 - 5. High and low temperatures, humidity, general weather conditions.
 - 6. Accidents and unusual events.
 - 7. Meetings and significant decisions.
 - 8. Stoppages, delays, shortages, losses.
 - 9. Emergency procedures.
 - 10. Orders and requests of governing/inspecting authorities.
 - 11. Change Orders received, implemented.
 - 12. Field tests and inspections. Meter readings and similar recordings.
 - 13. Partial Completions.
 - 14. Substantial Completions authorized.

1.7 PRODUCT DATA

- A. Collect Product Data into a single submittal for each element of construction or system.

Product Data includes printed information such as manufacturer's installation instructions, catalog cuts, standard color charts, and performance curves.

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:
 - a. Manufacturer's printed recommendations.
 - b. Compliance with recognized trade association standards.
 - c. Compliance with recognized testing agency standards.
 - d. Application of testing agency labels and seals.
 - e. Notation of dimensions verified by field measurement.
 - f. Notation of coordination requirements.
2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.
3. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.
4. Submittals: Submit a minimum of three (3) copies of each required submittal. The Architect will retain two, and will return the other marked with action taken and corrections or modifications required. If digital (pdf) files are provided, a minimum of one (1) hard copy is required.
 - a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
5. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.
6. Do not proceed with installation until an applicable copy of Product Data applicable is in the installer's possession.
7. Do not permit use of unmarked copies of Product Data in connection with construction.

1.8 SAMPLES

- A. Submit fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of materials, color range sets, and swatches showing color, texture and pattern.
 1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Include the following:
 - a. Generic description of the Sample.
 - b. Sample source.
 - c. Product name or name of manufacturer.
 - d. Compliance with recognized standards.
 - e. Availability and delivery time.
 2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these

characteristics between the final submittal and the actual component as delivered and installed.

3. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.

B. Submittals: Submit digital sets; one will be returned marked with the action taken.

1. Maintain sets of Samples, as returned, at the Project site, for quality comparisons throughout the course of construction.
2. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
3. Sample sets may be used to obtain final acceptance of the construction associated with each set.

C. Field Samples specified in individual Sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the Work will be judged.

1. Comply with submittal requirements to the fullest extent possible. Process transmittal forms to provide a record of activity.

1.9 ARCHITECT'S ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect will review each submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is the Contractor's responsibility

B. Action Stamp: The Architect will stamp each submittal with a uniform, self-explanatory action stamp.

PART 2 - PRODUCTS (Not Applicable).

PART 3 - EXECUTION (Not Applicable).

END OF SECTION 01 33 00

SECTION 01 60 00 - PRODUCT REQUIREMENTS

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 selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
 - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
 - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
 - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.4 ACTION SUBMITTALS

- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
 2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within **15** days of receipt of request, or **seven** days of receipt of additional information or documentation, whichever is later.
 - a. Form of Approval: As specified in Section 01 33 00 "Submittal Procedures"
 - b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.
- B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 "Submittal Procedures" Show compliance with requirements.

1.5 QUALITY ASSURANCE

- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
1. Each contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
 2. If a dispute arises between contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.
- B. Delivery and Handling:
1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.
 2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.
 3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.
 4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.
2. Store materials in a manner that will not endanger Project structure.
3. Store products that are subject to damage by the elements, under cover in an enclosure above ground, with ventilation adequate to prevent condensation.
4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
6. Protect stored products from damage and liquids from freezing.
7. Provide a secure location and enclosure at Project site for storage of materials and equipment by Owner's construction forces. Coordinate location with Owner.

1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
 2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
 2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
 3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Section 01 77 00 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
 2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
 3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
 4. Where products are accompanied by the term "as selected," Architect will make selection.
 5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
 6. Or Equal: For products specified by name and accompanied by the term "or equal," or "or approved equal," or "or approved," comply with requirements in "Comparable Products" Article to obtain approval for use of an unnamed product.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
 3. Products:
 - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
 - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
 4. Manufacturers:
 - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.

- b. **Nonrestricted List:** Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
- 5. **Basis-of-Design Product:** Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
- C. **Visual Matching Specification:** Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
 - 1. If no product available within specified category matches and complies with other specified requirements, confirm substitution with Architect.
- D. **Visual Selection Specification:** Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

- A. **Conditions for Consideration:** Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
 - 1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
 - 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
 - 3. Evidence that proposed product provides specified warranty.
 - 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
 - 5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 77 00 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Inspection procedures.
 - 2. Warranties.
 - 3. Final cleaning.
- B. Related Sections include the following:
 - 1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.
 - 1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
 - 2. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 3. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities.
 - 4. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs damage, property surveys, and similar final record information.
 - 5. Personnel of changeover in security provisions.
 - 6. Complete final cleaning requirements, including touchup painting.
 - 7. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
- B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection

or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
2. Results of completed inspection will form the basis of requirements for Final Completion.

1.4 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
 1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
 2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

1.5 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
 1. Organize list of spaces in sequential order
 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
 3. Include the following information at the top of each page:
 - a. Project name.
 - b. Date.
 - c. Name of Architect.
 - d. Name of Contractor.
 - e. Page number.

1.6 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 - 1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.
 - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
 - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- C. Provide additional copies of each warranty to include in operation and maintenance manuals.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cleaning Agents: Use cleaning materials and agents recommended by manufacturer or fabricator of the surface to be cleaned. Do not use cleaning agents that are potentially hazardous to health or property or that might damage finished surfaces.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

- b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
 - d. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - e. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - f. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
 - g. Remove labels that are not permanent.
 - h. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
 - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
 - i. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - j. Replace parts subject to unusual operating conditions.
 - k. Leave Project clean and ready for occupancy.
- C. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- D. Comply with safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

END OF SECTION 01 77 00

SECTION 01 78 39 - PROJECT RECORD DOCUMENTS

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 project record documents, including the following:
 - 1. Record Drawings.
 - 2. Record Specifications.
 - 3. Record Product Data.
 - 4. Miscellaneous record submittals.
- B. Related Requirements:
 - 1. Section 01 77 00 "Closeout Procedures" for general closeout procedures.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit one set of marked-up record prints.
 - 2. Number of Copies: Submit copies of record Drawings as follows:
 - a. Initial Submittal:
 - 1) Submit one paper-copy set of marked-up record prints.
 - 2) Submit PDF electronic files of scanned record prints.
 - 3) Submit record digital data files and one set of plots.
 - 4) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
 - b. Final Submittal:
 - 1) Submit three paper-copy set(s) of marked-up record prints.
 - 2) Submit PDF electronic files of scanned record prints and three set(s) of prints.
 - 3) Print each drawing, whether or not changes and additional information were recorded.

- c. Final Submittal:
 - 1) Submit one paper-copy set(s) of marked-up record prints.
 - 2) Submit record digital data files and three set(s) of record digital data file plots.
 - 3) Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Specifications: Submit one annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.
- C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
 - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- D. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.
- E. Reports: Submit written report weekly indicating items incorporated into project record documents concurrent with progress of the Work, including revisions, concealed conditions, field changes, product selections, and other notations incorporated.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
 - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
 - a. Accurately record information in an acceptable drawing technique.
 - b. Record data as soon as possible after obtaining it.
 - c. Cross-reference record prints to corresponding archive photographic documentation.
 - 2. Content: Types of items requiring marking include, but are not limited to, the following:
 - a. Dimensional changes to Drawings.
 - b. Revisions to details shown on Drawings.
 - c. Depths of foundations below first floor.
 - d. Locations and depths of underground utilities.

- e. Revisions to routing of piping and conduits.
 - f. Revisions to electrical circuitry.
 - g. Actual equipment locations.
 - h. Duct size and routing.
 - i. Locations of concealed internal utilities.
 - j. Changes made by Change Order or Construction Change Directive.
 - k. Changes made following Architect's written orders.
 - l. Details not on the original Contract Drawings.
 - m. Field records for variable and concealed conditions.
 - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
 4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
 5. Mark important additional information that was either shown schematically or omitted from original Drawings.
 6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
 2. Format: DWG, Microsoft Windows operating system.
 3. Format: Annotated PDF electronic file with comment function enabled.
 4. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
 5. Refer instances of uncertainty to Architect for resolution.
 6. Architect will furnish Contractor one set of digital data files of the Contract Drawings for use in recording information.
 - a. See Section 01 33 00 "Submittal Procedures" for requirements related to use of Architect's digital data files.
 - b. Architect will provide data file layer information. Record markups in separate layers.
- C. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
 2. Consult Architect for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate

newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.

- D. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
 2. Format: Annotated PDF electronic file.
 3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
 4. Identification: As follows:
 - a. Project name.
 - b. Date.
 - c. Designation "PROJECT RECORD DRAWINGS."
 - d. Name of Architect
 - e. Name of Contractor.

2.2 RECORD SPECIFICATIONS

- A. Preparation: Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
 2. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including substitutions and product options selected.
 3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 4. For each principal product, indicate whether record Product Data has been submitted in operation and maintenance manuals instead of submitted as record Product Data.
 5. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file scanned PDF electronic file(s) of marked-up paper copy of Specifications.

2.3 RECORD PRODUCT DATA

- A. Preparation: Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
1. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.

2. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
 3. Note related Change Orders, record Specifications, and record Drawings where applicable.
- B. Format: Submit record Product Data as annotated PDF electronic file and scanned PDF electronic file(s) of marked-up paper copy of Product Data.
1. Include record Product Data directory organized by Specification Section number and title, electronically linked to each item of record Product Data.

2.4 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.
- B. Format: Submit miscellaneous record submittals as PDF electronic file and scanned PDF electronic file(s) of marked-up miscellaneous record submittals.
1. Include miscellaneous record submittals directory organized by Specification Section number and title, electronically linked to each item of miscellaneous record submittals.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

- A. Recording: Maintain one copy of each submittal during the construction period for project record document purposes. Post changes and revisions to project record documents as they occur; do not wait until end of Project.
- B. Maintenance of Record Documents and Samples: Store record documents and Samples in the field office apart from the Contract Documents used for construction. Do not use project record documents for construction purposes. Maintain record documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to project record documents for Architect's reference during normal working hours.

END OF SECTION 01 78 39

SECTION 06 10 00 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Division 7 Section "Joint Sealers" for sealants.
 - 2. Division 9 Section "Painting" for back priming and finishing of finish carpentry.

1.2 SUMMARY

- A. Section Includes:
 - 1. Carpentry work not specified as part of other sections and which generally is not exposed, except as otherwise indicated.
 - 2. Rough carpentry for:
 - a. Miscellaneous lumber for attachment and support of other work.
 - 3. Preservative treatment.

1.3 REFERENCES

- A. APA Form E30L -- Residential & Commercial; American Plywood Association; 1990.
- B. APA PRP-108 -- Performance Standards and Policies for Structural-Use Panels; American Plywood Association; 1988 (Revised 1989).
- C. ASTM A 153-82(87) -- Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware; 1982 (Reapproved 1987).
- D. AWPB LP-2-88 -- American Wood Preservers Bureau Quality Control and Inspection Procedures for Softwood Lumber, Timber and Plywood Pressure Treated with Waterborne Preservatives for Above Ground Use; 1988.
- E. AWPB LP-22-88 -- American Wood Preservers Bureau Quality Control and Inspection Procedures for Softwood Lumber, Timber and Plywood Pressure Treated with Waterborne Preservatives for Ground Contact Use; 1988.
- F. Standard Grading Rules for Southern Pine Lumber; Southern Pine Inspection Bureau (SPIB); 1991 (with Supplements No. 1, 2, 3 and 4).

- G. National Design Specification for Wood Construction; American Forest and Paper Association (formerly National Forest Products Association; 1991.
- H. Design Values for Wood Construction, A Supplement to the 1991 Edition National Design Specification; American Forest and Paper Association (formerly National Forest Products Association); 1991.
- I. NBS PS 1-83 -- Construction and Industrial Plywood; U.S. Department of Commerce, National Bureau of Standards; 1983 (with 1984 Revision).
- J. NBS PS 20-70(86) -- American Softwood Lumber Standard; U.S. Department of Commerce, National Bureau of Standards; 1970 (Amended 1986).
- K. NFPA WCD #1 -- Manual for Wood Frame Construction; American Forest and Paper Association (formerly National Forest Products Association); 1988.

1.4 SUBMITTALS

- A. Framing Connectors and Supports: Submit manufacturer's standard data demonstrating compliance with building code requirements.
- B. Material Certificates: For dimension lumber specified by minimum allowable unit stress, submit:
 - 1. Statement of species and grade selected for each application.
 - 2. Grading agency's grading rules showing allowable design values accepted by the Board of Review of American Lumber Standards Committee.
- C. Treated Wood: Treating plant's instructions for use, including storage, cutting, and finishing.
 - 1. Pressure preservative treatment: Treating plant's certification of compliance with specified standards and stating process employed and preservative retention values.

1.5 QUALITY ASSURANCE

- A. Lumber: Comply with NBS PS 20 and approved grading rules and inspection agencies.
- B. Grade Stamps for Concealed Lumber: Each piece of lumber, applied by inspection agency and showing compliance with each specified requirement.

1.6 DELIVERY STORAGE AND HANDLING

- A. Protect wood products against moisture and dimensional changes. Support stacks at several uniformly spaced points to prevent deformation. Store stacks raised above ground. Cover to protect from rain and snow. Select and arrange cover to allow air circulation under and all around stacks to prevent condensation. Maintain and restore displaced coverings. Remove from the site any wood products that have been subjected to moisture or that do not comply with the specified moisture requirements.

PART 2 - PRODUCTS

2.1 DIMENSION LUMBER

- A. Size: Provide nominal sizes indicated, complying with NBS PS 20 except where actual sizes are specifically required.
 - 1. Surfacing: Smooth lumber.
 - 2. Moisture content: Kiln-dry or MC15 (15 percent maximum moisture content).

- B. Miscellaneous Lumber: Provide dimension lumber and boards necessary for the support of work specified in other sections, whether or not specifically indicated, and including but not limited to blocking, nailers, etc.
 - 1. Moisture content: 15 percent maximum (kiln-dry).
 - 2. Lumber: S4S, No. 2 or standard grade.
 - 3. Boards: Construction, 2 common, or No. 2 grade.

2.2 BOARDS - LESS THAN 2 INCHES THICKNESS

- A. Moisture Content: Kiln-dry (15 percent maximum).

- B. Surfacing: Smooth.

- C. Grading Agency:
 - 1. SPIB.

- D. Species:
 - 1. Any allowed under referenced grading rules.

- E. Grade: No. 2, 2 common, or construction boards.

2.3 MISCELLANEOUS MATERIALS

- A. Fasteners: Provide as required by applicable codes and as otherwise indicated.
 - 1. Provide fasteners with a hot-dip zinc coating (ASTM A 153) for treated lumber and where wood is in ground contact, subjected to high relative humidity, or exposed to weather.

- B. Framing Connectors and Supports: Prefabricated, formed steel units; hot-dip galvanized finish unless otherwise indicated; type and size as required; approved by applicable codes.

2.4 WOOD TREATMENT BY PRESSURE PROCESS

- A. Above ground Lumber: AWPB ACQ (waterborne preservatives).
 - 1. Manufacturer's standard moisture content.
 - 2. Treat the following:
 - a. Wood in contact with roofing, flashing, or waterproofing.
 - b. Wood in contact with masonry or concrete.
 - c. Wood within 18 inches of grade.
 - d. All wood noted as pressure treated.
 - e. Other members indicated.
- B. Ground Contact Treatment: AWPB ACQ. (waterborne preservatives).
 - 1. Treat the following:
 - a. Wood in contact with ground.
 - b. All wood notes as pressure treated.
- C. Fasteners for Preservative Treated Wood: Hot-dip galvanized steel (ASTM A153).

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. Arrange work to use full length pieces except where lengths would exceed commercially available lengths. Discard pieces with defects that would lower the required strength or appearance of the work.
- B. Cut and fit members accurately. Install plumb and true to line and level.
- C. Fasten carpentry in accordance with applicable codes and recognized standards.
- D. Where exposed, countersink nails and fill flush with suitable wood filler.
- E. Use fasteners of appropriate type and length. Pre-drill members when necessary to avoid splitting wood.

3.2 MISCELLANEOUS CARPENTRY

- A. Provide miscellaneous blocking, nailers, grounds, and framing as shown and as required for support of facing materials, fixtures, specialty items, and trim. Cut and shape to the required size. Provide in locations required by other work.
- B. Use countersunk fasteners appropriate to applied loading.
- C. Install permanent grounds for concrete and masonry where required.

3.3 WOOD FRAMING - GENERAL

- A. Comply with sizes, spacing, and configurations indicated. Where not specifically indicated, comply with applicable codes and NFPA "Manual for Wood Frame Construction." Splice members only where specifically indicated or approved.
- B. Space fasteners as indicated. Where not specifically indicated, comply with applicable codes and the "Recommended Nailing Schedule" of NFPA "Manual for Wood Frame Construction" and "National Design Specification for Wood Construction."

END OF SECTION 06 10 00

SECTION 07 06 70 - ROOF SPECIALTIES AND ACCESSORIES

- 1.1 Standards: Comply with SMACNA "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated. Comply with "NRCA Roofing and Waterproofing Manual" details for installation of units.
- 1.2 Roof Accessory Materials: Miscellaneous Units:
 - A. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.
 - B. Roofing Cement: FS SS-C-153, type which is compatible with roofing, containing no asbestos and normally free of sulfur.
 - C. Mastic Sealant: Polyisobutylene, nonhardening, nonskinning, nondrying, nonmigrating sealant.
 - D. Roof Scuttle Safety Rail: Roof scuttle safety rail with self closing gate to be Bil-Guard Hatch Rail System or better.
 - E. Pillow Block Pipestand: Model 24-R by Miro Industries, Inc. or similar.
- 1.3 Installation:
 - A. Flange Seals: Except as otherwise indicated, set flanges of accessory units in a thick bed of roofing cement or mastic sealant, to form a seal.
 - B. Anchor units securely to supporting structure, except for small accessory items which are bedded and stripped into roofing support.
 - C. Coordinate installation with deck construction, vapor barrier (if any), insulation, roofing and flashing work, to provide waterproof and weatherproof installations, in accordance with Construction Details of NRCA Roofing and Waterproofing Manual.
 - D. Separate dissimilar metals by coating surfaces with bituminous coating or other permanent separation.

END OF SECTION 07 06 70

SECTION 07 54 16 - KETONE ETHYLENE ESTER (KEE) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered thermoplastic KEE roofing system on a prepared existing roof substrate, including:
2. Roof insulation.
3. Roof insulation cover board.

B. Related Sections:

1. Division 06 rough carpentry section for wood nailers and blocking.
2. Division 07 Section "Preparation for Re-Roofing" for recover board beneath new membrane roofing.
3. Division 07 Section "Sheet Metal Flashing and Trim" for shop-formed sheet metal items including roof drainage system items, roof penetration flashings, base and counterflashings and reglets, and formed copings and roof edge metal items.
4. Division 07 Section "Roof Accessories" for manufactured roof curbs and supports, hatches, and manufactured penetration flashings.
5. Division 07 Section "Joint Sealants" for joint sealants, joint fillers, and joint preparation.

C. Alternates: Refer to Division 01 Section "Alternates" for description of Work in this Section affected by alternates.

D. Allowances: Refer to Division 01 Section "Allowances" for description of Work in this Section affected by allowances.

E. Unit Prices: Refer to Division 01 Section "Unit Prices" for description of Work in this Section affected by unit prices.

1.2 DEFINITIONS

A. Roofing Terminology: See ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" for definition of terms related to roofing work in this Section.

1.3 ACTION SUBMITTALS

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

- B. Sustainable Design Submittals:
 - 1. Product Test Reports for Solar Reflectance: For roof materials, indicating that roof materials comply with Solar Reflectance Index requirement.
 - 2. Product Data and Laboratory Test Reports: For adhesives and sealants, indicating compliance with requirements for low-VOC/low-emitting materials.
- C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.
 - 1. Base flashings and membrane terminations.
 - a. Indicate details meet requirements of NRCA and FMG required by this Section.
 - 2. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- D. Samples for Verification: For the following products:
 - 1. Sheet roofing, of color specified, including T-shaped side and end lap seam.
- E. Wind Uplift Resistance Submittal: For roofing system, indicating compliance with wind uplift performance requirements.

1.4 INFORMATIONAL SUBMITTALS

- A. Contractor's Product Certificate: Submit certificate, indicating products intended for Work of this Section, including product names and numbers and manufacturers' names, with statement indicating that products to be provided meet the requirements of the Contract Documents.
- B. Qualification Data: For Installer, Manufacturer, Professional Engineer, and Roofing Inspector.
 - 1. Include letter from Manufacturer written for this Project indicating approval of Installer.
- C. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
 - 1. Submit evidence of compliance with performance requirements, including FM Global listing.
 - 2. Product Compatibility: Indicate manufacturer has verified compatibility of roofing system components, including but not limited to: Roofing membrane, flashing sheets, adhesives, and sealants.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for components of membrane roofing system.
- E. Warranties: Unexecuted sample copies of special warranties.

- F. Inspection Reports: Daily reports of Roofing Inspector. Include weather conditions, description of work performed, tests performed, defective work observed, and corrective actions taken to correct defective work.

1.5 CLOSEOUT SUBMITTALS

- A. Executed copies of warranties.
- B. Maintenance Data: To include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and certified by manufacturer, including a full-time on-site supervisor with a minimum of five years' experience installing products comparable to those specified, able to communicate verbally with Contractor, Architect, and employees, and qualified by the manufacturer to install manufacturer's product and furnish warranty of type specified.
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section, UL listed for roofing systems comparable to that specified for this Project, with minimum five years' experience in manufacture of thermoplastic roof membrane products in successful use in similar applications.
 - 1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of five installations of specified products not less than five years old, with Owner and Architect contact information.
 - e. Sample warranty.
 - 2. Substitutions following award of contract are not allowed except as stipulated in Division 01 General Requirements.
 - 3. Approved manufacturers must meet separate requirements of Submittals Article.
- C. Roofing Inspector Qualifications: A technical representative of manufacturer not engaged in the sale of products and experienced in the installation and maintenance of the specified roofing system, qualified to perform roofing observation and inspection specified in Field Quality Control Article, to determine Installer's compliance with the requirements of this Project, and approved by the manufacturer to issue warranty certification. The Roofing Inspector shall be one of the following:

1. An authorized full-time technical employee of the manufacturer.
 2. An independent party certified as a Registered Roof Observer by the Roof Consultants Institute, retained by the Contractor or the Manufacturer and approved by the Manufacturer.
- D. Manufacturer's Installation Instructions: Obtain and maintain on-site access to manufacturer's written recommendations and instructions for installation of products.
- E. Preinstallation Roofing Conference: Conduct conference at Project site.
1. Meet with Owner, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
 2. Review drawings and specifications.
 3. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
 4. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 5. Examine substrate conditions and finishes for compliance with requirements, including flatness and fastening.
 6. Review structural loading limitations of roof deck during and after roofing.
 7. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
 8. Review governing regulations and requirements for insurance and certificates if applicable.
 9. Review temporary protection requirements for roofing system during and after installation.
 10. Review roof observation and repair procedures after roofing installation.

1.7 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 in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials and place equipment in a manner to avoid permanent deflection of deck.

1.8 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit roofing system to be installed according to manufacturer's written instructions and warranty requirements.
- B. Daily Protection: Coordinate installation of roofing so insulation and other components of roofing system not permanently exposed are not subjected to precipitation or left uncovered at the end of the workday or when rain is forecast.
 1. Provide tie-offs at end of each day's work to cover exposed roofing and insulation with a course of roofing sheet securely in place with joints and edges sealed.
 2. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing.
 3. Remove and discard temporary seals before beginning work on adjoining roofing.

1.9 WARRANTY

- A. Manufacturer: Manufacturer's standard warranty form, covering work of this Section and extended system components indicated, in which manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within warranty period.
 1. Warranty Period: 20 years from date of substantial completion. Warranty may be extended with special provisions up to 30 years.
- 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 membrane roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, and walkway products, for the following warranty period:
 1. Warranty Period: 3 years from date of substantial completion.
- C. Manufacturer Inspection Services: By manufacturer's technical representative, to report maintenance responsibilities to Owner necessary for preservation of Owner's warranty rights. The cost of manufacturer's inspections is included in the Contract Sum.
 1. Inspections to occur in following years: 2, 5, 10, 15, and 20 following completion.

PART 2 - PRODUCTS

2.1 KEE MEMBRANE ROOFING

- A. Ketone Ethylene Ester (KEE) Sheet: ASTM D6754/D6754M, fabric reinforced, 1.5mm (60 mils) with fabric backing
 - 1. Color: White
- B. Manufacturers: Subject to compliance with requirements, provide products by available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
 - 1. Basis-of-Design Manufacturer/Product: FiberTite KEE 60 mil single ply roofing system. Other projects considered equal or better:
 - a. Garland – KEE-Stone 60 mil roofing system
 - b. Tremco – TremPly KEE 60 mil roofing system
 - c. Other products are to be approved as equal prior to bidding.
 - 2. Source Limitations: Obtain components for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed membrane roofing and base 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. Membrane roofing and base flashings shall remain watertight.
 - 1. Accelerated Weathering: Roofing system shall withstand 10,000 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/C 3746M, ASTM D 4272/D 4272M, or the "Resistance to Foot Traffic Test" in FM Approvals 4470.
- B. Roofing System Design: Provide membrane roofing system that is identical to systems that have been successfully tested by a qualified testing and inspecting agency in accordance with ANSI/FM 4474, UL 580, or UL 1897, and to resist uplift pressures calculated in accordance with ASCE-7 and applicable code.
 - 1. All Zones (Corner, Perimeter, and Field-of-Roof) Uplift Pressures: As indicated on Drawings.
- C. Flashings and Fastening: Comply with requirements of Division 07 Sections "Sheet Metal Flashing and Trim" and "Roof Specialties." Provide base flashings, perimeter flashings, detail

flashings and component materials and installation techniques that comply with requirements and recommendations of the following:

1. FM Global 1-49: Loss Prevention Data Sheet for Perimeter Flashings.
 2. FM Global 1-29: Loss Prevention Data Sheet for Above Deck Roof Components.
 3. NRCA Roofing Manual for construction details and recommendations.
 4. SMACNA Architectural Sheet Metal Manual for construction details.
- D. Exterior Fire-Test Exposure: UL 790, Class A; for application and roof slopes indicated, as determined by testing identical membrane roofing materials by a qualified testing agency. Materials shall be identified with appropriate markings of applicable testing agency.
- E. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- F. Energy Performance: Roofing system shall have an initial solar reflectance index of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

2.3 MATERIALS, GENERAL

- A. 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.

2.4 SBS MODIFIED BITUMEN BASE SHEET MATERIAL

- C. Roofing membrane and flashing base sheet: Type 1 polyester reinforced SBS modified asphalt sheet for application method specified. Subject to compliance with manufacturer's requirements:
1. Basis of Design sheet but not limited to: FiberTite Base Sheet, FTR SBS Poly 3.7 Base Sheet

2.5 THERMOPLASTIC MEMBRANE MATERIALS

- A. KEE Roof Membrane:
1. Thermoplastic Ketone Ethylene Ester (KEE) coated polyester fabric-reinforced roof membrane sheet, ASTM D6754.
 - a. Basis of design product: FiberTite, KEE Single Ply Roof Membrane.
 - b. Breaking Strength, minimum, ASTM D751: Machine direction, 500 lbf; Cross machine direction, 400 lbf.

- c. Tear Strength, minimum, ASTM D751: Machine direction, 125 lbf; Cross machine direction, 145 lbf.
 - d. Elongation at Break, ASTM D751: 20 percent.
 - e. Dynamic Impact/Puncture Resistance, ASTM D5635: Pass.
 - f. Minimum Membrane Thickness, nominal, less backing, ASTM D751: 60 mils.
 - g. Thickness over fiber, optical method: 0.014 inches.
 - h. Accelerated Weathering, ASTM G155 and ASTM G154: >5,000 hr., no cracking or crazing.
 - i. Abrasion Resistance, ASTM D3389: >2000 cycles, H-18 wheel, 1,000 g load.
 - j. Color: White.
 - k. Solar Reflectance Index (SRI), ASTM E1980: 110 (White, initial), 86 (White, 3-yr aged).
- B. Sheet Flashing: Manufacturer's standard smooth-backed sheet flashing of same material, type, reinforcement, thickness, and color as KEE sheet membrane.

2.6 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary membrane roofing materials recommended by roofing system manufacturer for intended use, and compatible with membrane roofing.
- 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Membrane Bonding Adhesive:
- 1. Bonding adhesive, solvent based fast drying, VOC-compliant, for bonding KEE smooth-backed single ply membranes and flashings to substrates.
 - a. Basis of design product: FiberTite, Alpha-Tite with KEE-Bond.
 - b. VOC, maximum, ASTM D 3960: 200 g/L.
- C. Flashing Membrane Adhesive:
- 1. Bonding adhesive, solvent based fast drying, VOC-compliant, for bonding KEE smooth-backed single ply membranes and flashings to substrates.
 - a. Basis of design product: FiberTite, Alpha-Tite with KEE-Bond.
 - b. VOC, maximum, ASTM D 3960: 200 g/L.

- D. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- E. Metal Battens: Manufacturer's standard, aluminum-zinc-alloy-coated or zinc-coated steel sheet, approximately 1 inch wide by 0.05 inch thick, prepunched.
- F. Edge Metal: Perimeter securement system consisting of polymeric factory coated heat weldable aluminum or steel sheet metal flashing.
 - 1. Basis of Design: FiberClad, .040 Aluminum with .020 film thickness.
 - 2. Fabricated and installed to meet ANSI/SPRI ES-1 requirements.
- G. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Approvals 4470, designed for fastening components to substrate, and acceptable to membrane roofing system manufacturer.
- H. Termination Joint Sealant: Silicone, S, NS, 25 or 50, NT: Single-component, non sag, plus 25 to 50 percent and minus 25 to 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT, and compatible with adjacent materials.
- I. Prefabricated Pipe Flashings: As recommended by roof membrane 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, and other accessories.

2.7 ROOF INSULATION MATERIALS

- A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from insulation manufacturer's standard sizes, suitable for application, and of thicknesses indicated.
- B. Roof Insulation: Provide roof insulation product in thicknesses indicated in Part 3 as follows:
 - 1. Polyisocyanurate board insulation, ASTM C1289 Type II Class 1 CFC- and HCFC- free, with recycled content glass-fiber mat facer on both major surfaces.
 - a. Basis of design product: FiberTite, FTR-Value Insulation.
 - b. Compressive Strength, ASTM C1621: Grade 3: 25 psi.
 - c. Conditioned Thermal Resistance at 75 deg. F: 14.4 at 2.5 inches thick.
- C. Cover Board:
 - 1. Cellulosic fiber reinforced water-resistant gypsum panel, ASTM D1278/C1278M.

- a. Basis of design product: FiberTite/DensDeck.
 - b. Thickness: 1/2 inch.
- D. Roof Insulation Adhesive:
- 1. Cold fluid-applied bead-applied low-rise adhesive, two-component solvent-free low odor elastomeric urethane, formulated to adhere roof insulation to substrate.
 - a. Basis of design product: FiberTite, Polyset Board-Max Insulation Adhesive.
 - b. Flame Spread Index, ASTM E84: 10.
 - c. Smoke Developed Index, ASTM E84: 30.
 - d. Volatile Organic Compounds (VOC), maximum, ASTM D3960: 0 g/L.
 - e. Tensile Strength, minimum, ASTM D412: 250 psi.
 - f. Peel Adhesion, minimum, ASTM D903: 17 lbf/in.
 - g. Flexibility, 70 deg. F, ASTM D816: Pass.
- E. Insulation Cant Strips: ASTM C 208, Type II, Grade 1, cellulosic-fiber insulation board.
- F. Flexible Walkways: Roofing membrane manufacturer's factory-formed, nonporous, heavy duty slip-resisting, surface-textured walkway pads, approximately 5 mm thick.
- 1 Colors and Texture: From manufacturer's standard colors. Color to contrast with finished roof color.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with the following requirements and other conditions affecting performance of roofing system:
 - 1. Verify that roof openings and penetrations are in place and curbs are set and braced and that roof drain bodies are securely clamped in place.
 - 2. Verify that wood cants, blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
 - 3. Existing Prepared Roof Substrate: Verify that existing insulation and substrate is sound and dry. Refer to requirements of Section 070150 "Preparation for Reroofing."
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing 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 rain is forecast.
- C. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

3.3 INSTALLATION, GENERAL

- A. Install roofing system in accordance with manufacturer's written instructions and approved details.
- B. Install wood cants, blocking, curbs, and nailers in accordance with requirements of Division 06 carpentry section.
- C. NRCA Installation Details: Install roofing system in accordance with applicable NRCA Manual Plates and NRCA recommendations; modify as required to comply with manufacturer's approved details and perimeter fastening requirements of FM Global references if applicable.

3.4 INSULATION INSTALLATION

- A. Coordinate installing membrane roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with membrane roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install insulation under 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 previous layer a minimum of 6 inches in each direction.
 - 1. Flat Insulation System on Sloped Metal Panels: Install insulation at minimum thickness as follows:
 - a. Minimum thickness of infill base layer: 2 inches.
 - b. Minimum thickness of each subsequent layer: 2 inches
 - c. Total thickness: 5 inches min.
 - d. Insulation R-value: Not less than average 'aged' R-25.

- 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. Mechanically Fastened and Adhered Insulation: Install each layer of insulation and secure first layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to structural steel elements.
 - 1. Fasten insulation according to requirements in FM Approvals' "RoofNav" for specified Windstorm Resistance Classification to resist uplift pressure at corners, perimeter, and field of roof.
 - 2. Set cricket layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
- F. Cover Boards: 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. Butt cover boards together.
 - 1. Fully adhere cover boards by setting in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining cover board in place to resist uplift pressure at corners, perimeter, and field of roof.

3.5 ADHERED MEMBRANE ROOFING INSTALLATION

- A. Adhere membrane roofing over area to receive roofing and install according to membrane roofing system manufacturer's written instructions.
- B. Start installation of membrane roofing in presence of membrane roofing system manufacturer's technical personnel.
- C. Accurately align membrane roofing and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Solvent-Based Bonding Adhesive: Apply to substrate and underside of membrane roofing at rate required by manufacturer and allow adhesive to become tacky before installing membrane roofing; do not allow adhesive to fully dry. Roll membrane into adhesive. Do not apply adhesive to splice area of membrane.
- E. In addition to adhering, mechanically fasten membrane roofing securely at terminations, penetrations, and perimeter of roofing.
- F. Apply membrane roofing with side laps shingled with slope of roof deck where possible.

- G. Welded Seams: Clean seam areas, overlap membrane roofing, and hot-air weld side and end laps of membrane roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
 - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet membrane.
 - 2. Verify field strength of seams a minimum of twice daily and repair seam sample areas.
 - 3. Repair tears, voids, and lapped seams in roofing that does not comply with requirements.
- H. Install membrane roofing and auxiliary materials to tie into existing roofing to maintain weathertightness of transition and to not void warranty for existing membrane roofing system.

3.6 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories and adhere to substrates according to membrane roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed 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 side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.

3.7 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified roofing inspector to perform roof tests and inspections and to prepare test reports.
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion and submit a report to the Architect and Contractor. Notify Architect and Owner 72 hours in advance of date and time of inspection.
- C. Repair or remove and replace components of membrane roofing system where inspections indicate that they do not comply with specified requirements.
- D. Additional inspections, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

3.8 PROTECTING AND CLEANING

- A. Protect membrane roofing system from damage and wear during remainder of construction period. When remaining construction will not affect or endanger roofing, inspect roofing 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 membrane roofing system that does not comply with requirements; repair substrates; and repair or reinstall membrane roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
- C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.
- D. Stage materials in such a manner that foot traffic is minimized over completed roof areas. Temporary walkways or platforms shall be installed in order to protect all completed roof areas from heavy traffic.
- E. All work areas are to be kept clean, clear and free from debris. All tools and unused material must be collected at the end of the workday and properly stored or disposed of.
- F. Properly clean the finished roof surface after completion, and ensure all drainage systems are unobstructed and free flowing.

3.9 ROOFING INSTALLER'S WARRANTY

- A. WHEREAS **<Insert name>** of **<Insert address>**, herein called the "Roofing Installer," has performed roofing and associated work ("work") on the following project:
 - 1. Owner: **<Insert name of Owner>**.
 - 2. Address: **<Insert address>**.
 - 3. Building Name/Type: **<Insert information>**.
 - 4. Address: **<Insert address>**.
 - 5. Area of Work: **<Insert information>**.
 - 6. Acceptance Date: **<Insert date>**.
 - 7. Warranty Period: **<Insert time>**.
 - 8. Expiration Date: **<Insert 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 he will, at his 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 72 mph (32.19 m/sec);
 - 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 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 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. 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 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 **<Insert day>** day of **<Insert month>**, **<Insert year>**.
1. Authorized Signature: **<Insert signature>**.
 2. Name: **<Insert name>**.
 3. Title: **<Insert title>**.

END OF SECTION 07 54 16

SECTION 07 60 00 - FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

1.2 DESCRIPTION OF WORK:

- A. The Types of work specified in this section include the following:

1. Metal counterflashing; and base flashing.
2. Edge metal.
3. Exposed metal trim.
4. Coping.
5. Scuppers.
6. Miscellaneous sheet metal accessories.
7. Plastic flashing.

1.3 JOB CONDITIONS:

- A. Coordinate work of this section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS:

- A. PVC Clad Stainless Steel and Galvanized Sheet Metal manufactured by the roofing system manufacturer shall be used for scuppers and edge metal, as noted.
- B. Stainless Steel: AISI Type 302/304, complying with ASTM A 167, 2D annealed finish, soft, except where harder temper required for forming or performance; 0.0156-inch thick (28 gauge) except as otherwise indicated.
- C. Aluminum: ASTM B 209, alloy 3003, temper H14, unless harder temper required for forming and performance, 0.032 thick (20 gage) except as otherwise indicated. Mil finish prepared for coating system as noted below. Color to be selected by Architect from manufacturer's standard selection.
- D. Fluoropolymer coating: Full strength 70% "Kynar 500" coating baked on for 15 minutes at 450 degrees F (232 degrees C), in a dry film thickness of 1.0 mil, 30% reflective gloss (ASTM D 523), over 0.2 mil baked on modified epoxy primer.

- E. Durability: Provide coating which has been field tested under normal range of weathering conditions for minimum of 20 years without significant peel, blister, flake, chip, crack or check in finish, and without chalking in excess of 8 (ASTM D 659), and without fading in excess of five NBS units.
- F. Elastic Sheet Flashing:
 - 1. Provide only flashings compatible with and acceptable to roofing system manufacturer.
- G. Miscellaneous Materials and Accessories:
 - 1. Solder: For use with stainless steel, provide 60 - 40 tin/lead solder (ASTM B 32), with acid-chloride type flux, except use rosin flux over tinned surfaces.
 - 2. Fasteners: Same metal as flashing/sheet metal or, other non-corrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
 - 3. Epoxy Seam Sealer: 2-part noncorrosive metal seam cementing compound, recommended by metal manufacturer for exterior/interior non-moving joints including riveted joints.
 - 4. Adhesives: Type recommended by flashing sheet manufacturer for waterproof/weather-resistant seaming and adhesive application of flashing sheet.
 - 5. Paper Slip Sheet: 5-lb rosin-sized building paper.
 - 6. Polyethylene Underlayment: 6-mil carbonated polyethylene film; FS L-P-512.
 - 7. Reglets: Metal or plastic units of type and profile indicated, compatible with flashing indicated, noncorrosive.
 - 8. Metal Accessories: Provide sheet metal clips, straps, anchoring devices and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.
 - 9. Roofing Cement: ASTM D 2822, asphaltic.

2.2 FABRICATED UNITS:

- A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown, and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance; with expansion provisions for running work, sufficient to permanently prevent leakage, damage or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

- B. Seams: Fabricate non-moving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.
- C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used, or would not be sufficiently water/weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1" deep, filled with mastic sealant (concealed within joints).
- D. Sealant Joints: Where movable, non-expansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.
- E. Form section square, true and accurate in size, in maximum possible lengths and free of distortions and defects detrimental to appearance or performance. Hem exposed edges. (Allow for expansion at joints.)
- F. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer/fabricator.

PART 3 - EXECUTION

3.1 INSTALLATION REQUIREMENTS:

- A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations, and with SMACNA "Architectural Sheet Metal Manual". Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints and seams, which will be permanently watertight and weatherproof.
- B. Underlayment: Where stainless steel or aluminum is to be installed directly on cementitious or wood substrates, install a slip sheet of red rosin paper and a course of polyethylene underlayment.
 - 1. Bed Flanges of work in a thick coat of bituminous roofing cement where required for waterproof performance.
 - 2. Install reglets to receive counter-flashing in manner and by methods required.
 - 3. Install counterflashing in reglets, either by snap-in seal arrangement, or by wedging in place for anchorage and filling reglet with mastic or elastomeric sealant.
 - 4. Install elastic flashing without stretching. Install elastic flashing filler strips to provide for movement by forming loops or bellows in width of flashing. Locate filler strips to facilitate complete drainage of water from flashing. Seam flashing sheets with adhesive, and anchor edges as required by manufacturer.

3.2 CLEANING AND PROTECTION:

- A. Clean exposed metal surfaces, removing substances, which might cause corrosion of metal or deterioration of finishes.
- B. Protection: Installer shall advise Contractor of required procedures for surveillance and protection of flashings and sheet metal work during construction, to ensure that work will be without damage or deterioration, other than natural weathering, at time of substantial completion.

END OF SECTION 07 60 00

SECTION 07 92 00 - JOINT SEALERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. Extent of each form and type of joint sealer is indicated on drawings and schedules.
- B. This Section includes joint sealers for the following locations:
 - 1. Exterior joints in vertical surfaces and nontraffic horizontal surfaces as indicated below.
 - a. Silicone sealants:
 - 1) Expansion and control joints in masonry and concrete joints indicated.
 - 2) Joints in prefinished metal panel joints indicated.
 - 3) Perimeter joints between materials listed above and metal flashings associated with roofing system.
 - 4) Joints between different materials listed above.
 - 5) Perimeter joints between hollow metal frame and masonry or concrete.
 - b. Urethane sealants:
 - 1) Joints as specifically indicated.
 - 2) Perimeter joints between materials listed above and metal flashings associated with bituminous or asphaltic materials.

1.3 RELATED SECTIONS:

- A. Special Coatings and Painting are specified in Division 9.

1.4 SYSTEM PERFORMANCES:

- A. Provide joint sealers that have been produced and installed to establish and maintain watertight and airtight continuous seals.

1.5 SUBMITTALS:

 The Bidder/Applicator of the sealant system specified in this section shall submit evidence of sealant manufacturer's approval of applicator for this specific project on manufacturer's letterhead and copy of sample sealant warranty within four days of bid opening.

- A. Product Data from manufacturers for each joint sealer product required, including instructions for joint preparation and joint sealer application.
- B. Certificates from manufacturers of joint sealers attesting that their products comply with specification requirements and suitable for the use indicated.
- C. Compatibility and adhesion test reports from elastomeric sealant manufacturer indicating that materials forming joint substrates and joint sealant backings have been tested for

- compatibility and adhesion with joint sealants. Include sealant manufacturer's interpretation of test results relative to sealant performance and recommendations for primers and substrate preparation needed to obtain adhesion.
- D. Compatibility with elastomeric coating system manufacturer certification and test reports indicating that materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with elastomeric coating system specified and submitted. Include elastomeric coating manufacturer's test results relative to coating performance and recommendations for primers and substrate preparation needed to obtain adhesion.
 - E. Product test reports for each type of joint sealers indicated, evidencing compliance with requirements specified.
 - F. Preconstruction field test reports indicating which products and joint preparation methods demonstrated acceptable adhesion to joint substrates.

1.6 QUALITY ASSURANCE:

- A. Single Source Responsibility for Joint Sealer Materials: Obtain joint sealer materials from a single manufacturer for each different product required.
 - 1. Investigate materials failing compatibility or adhesion tests and obtain joint sealer manufacturer's written recommendations for corrective measures, including use of specially formulated primers.
- B. Preconstruction Field Testing: Prior to installation of joint sealants, field-test their adhesion to joint substrates as follows:
 - 1. Locate test joints where indicated or, if not indicated, as directed by Architect.
 - 2. Conduct field tests for each application indicated below:
 - a. Each type of elastomeric sealant and joint substrate indicated.
 - 3. Test Method: Test joint sealers by hand pull method described below:
 - a. Install joint sealants in 5-foot joint lengths using same materials and methods for joint preparation and joint sealant installation required for completed Work. Allow sealants to cure fully before testing.
 - b. Make knife cuts as follows: A horizontal cut from one side of joint to the other followed by 2 vertical cuts approximately 2 inches long at side of joint and meeting horizontal cut at top of 2 inch cuts. Place a mark 1 inch from top of 2 inch piece.
 - c. Use fingers to grasp 2 inch piece of sealant just above 1 inch mark; pull firmly down at a 90 degree angle or more while holding a ruler along side of sealant. Pull sealant out of joint to the distance recommended by sealant manufacturer for testing adhesive capability, but not less than that equaling specified maximum movement capability in extension; hold this position for 10 seconds.
 - 4. Report whether or not sealant in joint connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each type of product and joint substrate.
 - 5. Evaluation of Field 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.
 - 6. Inspection and approval of joint preparation by Architect, Owner, and/or Manufacturer's Representative prior to application of new sealant.
 - 7. Test cuts of completed joint sealant installation at 25 locations determined by the

Architect, owner's Representative or Manufacturer's Representative to verify compliance.

- C. References: The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.
 - 1. ASTM D 4258-83 (1988) Standard Practice for Surface Cleaning Concrete for Coating.
 - 2. ASTM D 4262-83 (1988) Test Method for pH of Chemically Cleaned Concrete Surfaces.
 - 3. ASTM C-920, Type S, Grade NS, Class 25, Use T, NT, M, G, A, and O.
 - 4. Federal Specification TT-S-001543 A for silicone building sealants.
 - 5. Federal Specification TT-S-00230C for one-component building sealants.

1.7 DELIVERY, STORAGE, AND HANDLING:

- A. Deliver materials to Project site in original unopened containers or bundles with labels informing about manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturers' recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

1.8 PROJECT CONDITIONS:

- A. Environmental Conditions: Do not proceed with installation of joint sealers under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealer manufacturer or below 40 deg F (4.4 deg C).
 - 2. When joint substrates are wet due to rain, frost, condensation, or other causes.
- B. Joint Width Conditions: Do not proceed with installation of joint sealers where joint widths are less than allowed by joint sealer manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealers until contaminants capable of interfering with their adhesion are removed from joint substrates.

SPECIAL PROJECT SEALANT WARRANTIES

Special Project Warranties: Submit for verification following bid opening two copies of special 20 year "Sealant Guarantee" from Manufacturer, covering silicone sealant products of this section. Provide written warranties by the Contractor, and his authorized installer, agreeing to replace/repair defective materials and workmanship. Provide written warranty by the manufacturers of the sealant material agreeing to replace defective or failed materials within the specified warranty period. Repairs and replacements required because of events beyond Contractor's/Installer's/Manufacturer's control (and which exceed performance requirements) shall be completed by Contractor/Installer and paid for by the Owner.

Manufacturer's sealant warranty period is 20 years for silicone sealants. The manufacturer's sealant warranty period is 5 years for urethane sealants (to be issued in conjunction with manufacturer's coating warranty). Warranties to be nonprorated and no penal sum.

The Contractor and Installer's warranty period is two years after date of substantial project

completion with no dollar limit and no penal sum.

1.9 SEQUENCING AND SCHEDULING:

- A. Installation of joint sealer with other products as recommended by manufacturer of sealant, and other products. Submit manufacturer's recommendation of sequence.
- B. Sequence schedule installation of joint sealers as soon as possible following cut out of existing sealant, grinding and thoroughly cleaning joint, and inspection of joint preparation by Architect or Owner's Representative, unless otherwise indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL:

- A. Compatibility: Provide joint sealers, joint fillers and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealers indicated or, if not otherwise indicated, as selected by Architect from manufacturer's standard colors.

2.2 ELASTOMERIC JOINT SEALANTS:

- A. Elastomeric Sealant Standard: Provide manufacturer's standard neutral curing, elastomeric sealant of base polymer indicated which complies with requirements of Federal Specifications TT-S-00230C, Type II, Class A, and with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses.
- B. Single Part Neutral Curing Silicone Sealants for concrete, aluminum and glass joints, and other joints, unless specifically indicated otherwise; use NT: Type S, Grade NS, Class 25; and Uses NT, M, A, and O.

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

- a. Dow Corning 790 Silicone Sealant.
- b. Dow Corning 791 Silicone Sealant.

2. Joints indicated to be coated or painted:

- a. Dow Corning 756
 - 1) Minimum Performance Criteria:
- | | |
|--|-------|
| Colors: Minimum 10 standard colors | |
| MIL-S-8802 Tack-Free Time, 50% RH, hours | 1 |
| Curing Time RH @ 25 deg.C. (77 deg.F), days | 7-14 |
| MIL-S-8802 Full Adhesion, days | 14-21 |
| Flow, Sag or Slump, in 3-inch wide joint | None |
| Working Time, minutes | 10-20 |
| As Cured, after 7 days at 25 deg.C (77 deg.F) and 50% RH | |
| ASTM D 2240 Durometer Hardness, Shore A, points | 15 |
| ASTM D 412 Ultimate Tensile Strength, max. elongation, psi | 100 |
| ASTM D 412 Elongation, percent maximum | 1600 |
| MIL-S-8802 Peel Strength, lbs/in. | 25 |
| ASTM C 1135 Tensile Adhesion | |

With 25% extension	15
With 50% extension	20
TT-S-001543 Staining, after 14 days of 50% compression	None
Ozone Resistance	Good
Weathering, after 6000 hours in Atlas Weatherometer: Min. change in hardness	
Joint Movement Capabilities, percent,	
Extension	+100
Compression	-50
Fire Endurance, hours	2

C. One-Part Nonsag Urethane Sealants for joints indicated, Use NT: ASTM C-920, Type S; Grade NS; Class 25; and Uses NT, M, A, and, as applicable to joint substrates indicated, (Federal Specification TT-S-0023C, Type II, Class A).

1. Products: Subject to compliance with requirements and approval by the elastomeric coating manufacturer, provide one of the following products.

a. One-Part Nonsag, low modulus, high performance, Urethane Sealant for Use NT:

- 1) "Vulkem 116"; Mameco International, Inc.
- 2) "Vulkem 921"; Mameco International, Inc.
- 3) "Dynatrol I"; Pecora Corp.
- 4) "Sikaflex-1a"; Sika Corp.
- 5) "Sikaflex 15 LM"; Sika Corp.
- 6) "Sonolastic NP 1"; Sonneborn Building Products Div., Rexnord Chemical Products, Inc.
- 7) "Dynomix"; Tremco, Inc.

****Applicator to verify sealant manufacturer will provide specified warranty and products will comply with performance criteria.****

2.3 MISCELLANEOUS MATERIALS:

- A. Primer: Provide type recommended by joint sealer manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint sealer-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Provide nonstaining, chemical cleaners of type which are acceptable to manufacturers of sealants and sealant backing materials, which are not harmful to substrates and adjacent nonporous materials, and which do not leave oily residues or otherwise have a detrimental effect on sealant adhesion or in-service performance.
- C. Masking Tape: Provide nonstaining, nonabsorbent type compatible with joint sealants and to surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Examine joints indicated to receive joint sealers, with Installer present, for compliance with requirements for compliance with requirements for joint configuration, installation tolerances and other conditions affecting joint sealer performance. Do not proceed with installation of joint sealers until unsatisfactory conditions have been corrected.

3.2 PREPARATION:

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealers to comply with recommendations of joint sealer manufacturers and the following requirements:
 1. Remove all foreign material from joint substrates which could interfere with adhesion of joint sealer, including dust; paints, except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer; old joint sealers; oil; grease; waterproofing; water repellents; water; surface dirt; and frost.
 2. Clean concrete, masonry, unglazed surfaces of ceramic tile and similar porous joint substrate surfaces, by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealers. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
 3. Remove laitance and form release agents from concrete.
 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile; and other nonporous surfaces by chemical cleaners or other means, which are not harmful to substrates or leave residues capable of interfering with adhesion of joint sealers.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealer manufacturer based on preconstruction joint sealer-substrate tests or prior experience. Apply primer to comply with joint sealer manufacturer's recommendations. Confine primers to areas of joint sealer bond, do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant with adjoining surfaces which otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALERS:

- A. General: Comply with joint sealer manufacturers' printed installation instructions applicable to products and applications indicated, except where more stringent requirements apply.
- B. Elastomeric Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications and conditions indicated.
- C. Installation of Sealant Backing: Install sealant backings to comply with the following requirements:
- D. Install joint fillers of type indicated to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealant relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of joint fillers.
 2. Do not stretch, twist, puncture, or tear joint fillers.
 3. Remove absorbent joint fillers that have become wet prior to sealant application and replace with dry material.
- E. Install bond breaker tape between sealants and joint fillers, compression seals or back of joints where required to prevent third-side adhesion of sealant to back of joint.
- F. Installation of Sealants: Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint widths which allow optimum sealant movement capability.
- G. Tooling of Nonsag Sealants: Immediately after sealant application and prior to time skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated, to eliminate air pockets, and to ensure contact and adhesion of sealant with sides of joint. Remove excess sealants from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.
1. Provide concave joint configuration per Figure 6A in ASTM C 1193, unless otherwise indicated.
 2. Provide flush joint configuration per Figure 6B in ASTM C 1193, where indicated.
 3. Use masking tape to protect adjacent surfaces of recessed tooled joints.

3.4 CLEANING:

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

3.5 PROTECTION:

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

END OF SECTION 07 92 00

SECTION 09 91 00 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

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

1.2 SUMMARY:

- A. This Section includes surface preparation and field painting of the following:
 - 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.
 - 1. Painting includes field painting of exposed stucco and concrete.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
 - 1. Prefinished items include the following factory-finished components:
 - a. Finished mechanical and electrical equipment.
 - 2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
 - a. Pipe spaces.
 - 3. Finished metal surfaces include the following:
 - a. Anodized aluminum.
 - b. Stainless steel.
 - 4. Operating parts include moving parts of operating equipment and the following:
 - . Motor and fan shafts.
 - 5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.
- D. Related Sections include the following:
 - 1. Division 6 Section "Rough Carpentry" for attachment and support items.

1.3 DEFINITIONS:

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
 - 1. Flat refers to a lusterless or matte finish with a gloss range below 15 when measured at an 85-degree meter.
 - 2. Eggshell refers to low-sheen finish with a gloss range between 5 and 20 when measured at a 60-degree meter.
 - 3. Satin refers to low-sheen finish with a gloss range between 15 and 35 when measured at a 60-degree meter.
 - 4. Semigloss refers to medium-sheen finish with a gloss range between 30 and 65 when measured at a 60-degree meter.

5. Full gloss refers to high-sheen finish with a gloss range more than 65 when measured at a 60-degree meter.

1.4 SUBMITTALS:

- A. Product Data: For each paint system specified. Include block fillers and primers.
 1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
 2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
 3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
- B. Samples for Initial Selection: Manufacturer's color charts showing the full range of colors available for each type of finish-coat material indicated.
 1. After color selection, the Architect will furnish color chips for surfaces to be coated.
- C. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
 1. 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.
 2. Provide a list of materials and applications for each coat of each sample. Label each sample for location and application.
- D. 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.

1.5 QUALITY ASSURANCE:

- A. Applicator Qualifications: Engage an experienced applicator who has completed painting system applications similar in material and extent to that indicated for this Project with a record of successful in-service performance.
- B. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.
- C. 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.
 - a. Surfaces: Provide samples on surface 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 or surface 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 45 deg F (7 deg C). Maintain containers used in storage in a clean condition, free of foreign materials and residue.
 1. 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 and 90 deg F (10 and 32 deg C).
- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F (7.2 and 35 deg C).
- C. Do not apply paint in rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F (3 deg C) 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.

1.8 EXTRA MATERIALS:

- A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.

1. Quantity: Furnish the Owner with an additional 5 percent, but not less than 1 gal. (3.785 L) or 1 case, as appropriate, of each material and color applied.

PART 2 - PRODUCTS

2.1 MANUFACTURERS:

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, products listed in the paint schedules.
- B. Products: Subject to compliance with requirements, provide one of the products in the paint schedules.
- C. Manufacturers Names: The following manufacturers are referred to in the paint schedules by use of shortened versions of their names, which are shown in parentheses:
 1. Sherwin-Williams Co. (S-W).
 2. Benjamin Moore & Co. (Moore).
 3. Porter Paints
 4. PPG Industries, Inc. (PPG).
 5. ICI Paint World Group (ICI).

2.2 PAINT MATERIALS, GENERAL:

- A. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.
- B. Material Quality: Provide manufacturer's best-quality paint material of the various coating types specified. Paint-material containers not displaying manufacturer's product identification will not be acceptable.
 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. Furnish manufacturer's material data and certificates of performance for proposed substitutions.
- C. Colors: Provide color selections made by the Architect.

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 about anticipated problems using the materials specified over substrates primed by others.

3.2 PREPARATION:

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, 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 surface preparation and painting.
1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- 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 block, 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 abrasive blast-cleaning methods if recommended by 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 that permitted in manufacturer's written instructions.
 - c. Clean concrete floors to be painted with a 5 percent solution of muriatic acid or other etching cleaner. Flush the floor with clean water to remove acid, neutralize with ammonia, rinse, allow to dry, and vacuum before painting.
 3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.

- a. Blast steel surfaces clean as recommended by paint system manufacturer and according to requirements of SSPC-SP 10.
 - b. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
 - c. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- 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 to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
 - 3. Use only thinners approved by paint manufacturer and only within recommended limits.
- E. Tinting: Tint each undercoat a lighter shade to simplify identification of each coat when multiple coats of the same material are applied. Tint undercoats to match the color of the finish coat, but provide sufficient differences in shade of undercoats to distinguish each separate coat.

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. Paint colors, surface treatments, and finishes are indicated in the schedules.
 - 2. Do not paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to formation of a durable paint film.
 - 3. Provide finish coats that are compatible with primers used.
 - 4. 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.
 - 5. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 6. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
 - 7. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
 - 8. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.
 - 9. Finish interior of wall and base cabinets and similar field-finished casework to match exterior.

10. Sand lightly 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. 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.
 3. Allow sufficient time between successive coats to permit proper drying. Do not recoat surfaces until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and where application of another coat of paint does not cause the 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 material and texture required.
 3. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material and texture required.
- D. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- E. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.
- F. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled.
- G. Prime Coats: Before applying finish coats, apply a prime coat of material, 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.
- H. 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.

- I. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.
- 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 may 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 testing agency may perform appropriate tests for the following characteristics as required by the Owner:
 - a. Quantitative material analysis.
 - b. Abrasion resistance.
 - c. Apparent reflectivity.
 - d. Flexibility.
 - e. Washability.
 - f. Absorption.
 - g. Accelerated weathering.
 - h. Dry opacity.
 - i. Accelerated yellowness.
 - j. Recoating.
 - k. Skinning.
 - l. Color retention.
 - m. Alkali and mildew resistance.
 - 3. 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 noncomplying 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.
 - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

3.6 PROTECTION:

- A. 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.
- B. Provide "Wet Paint" signs 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. Two finish coats over a rust-inhibitive primer.
 - 1. 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 (0.033 mm).
 - a. Moore: IronClad Retardo Rust-Inhibitive Paint #163.
 - b. PPG: 6-208 Speedhide Interior/Exterior Rust Inhibitive Steel Primer.
 - c. S-W: Kem Kromik Metal Primer B50N2/B50W1.
 - 2. Semigloss, acrylic-enamel finish: 2 finish coats over a rust-inhibitive primer.
 - a. First and Second Coats: Semigloss, 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 (0.066 mm).
 - 1) Moore: MoorGlo Latex House & Trim Paint #096.
 - 2) PPG: 78 Line Sun-Proof Semi-Gloss Acrylic Latex House and Trim Paint.
- B. Zinc-Coated Metal: Provide the following finish systems over exterior zinc-coated (galvanized) metal surfaces: Two finish coats over a galvanized metal primer.
 - 1. Primer: Galvanized metal primer applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.2 mils (0.031 mm).
 - a. Moore: IronClad Galvanized Metal Latex Primer #155.
 - b. PPG: 90-709 Pitt-Tech One Pack Interior/Exterior Primer/Finish DTM Industrial Enamel.
 - c. S-W: DTM Acrylic Primer/Finish B66W1.
 - 2. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a galvanized metal primer.
 - a. First and Second Coats: Semigloss, 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 (0.066 mm).
 - 1) See "First and Second Coats, Semigloss Sheet Schedule for Ferrous Metal"

- C. Aluminum: Provide the following finish systems over exterior aluminum surfaces: Two finish coats over a primer.
 - 1. Primer: Rust-inhibitive, acrylic- or alkyd-based, metal primer, as recommended by the manufacturer for use over aluminum, applied at spreading rate recommended by the manufacturer to achieve a total dry film thickness of not less than 1.5 mils (0.038 mm).
 - a. See "Primer" Schedule for "Zinc Coated Metal".
 - 2. Semigloss, Acrylic-Enamel Finish: 2 finish coats over a primer.
 - a. First and Second Coats: Semigloss, 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 (0.066 mm).
 - 1) See "First and Second Coats: Semigloss Schedule for Ferrous Metal".

- D. Concrete and Stucco: Provide the following systems over exterior concrete and stucco surfaces: Two finish coats over a primer.
 - 1. Water-based 100% acrylic coating:
 - a. Prime Coat: Stucco and masonry primer:
 - 1) BASF – Thoro Primer 2K
 - 2) Sherwin Williams – Loxon Conditioner Bonding Primer A24W00100
 - b. Intermediate and Top Coat:
 - 1) BASF – Thorosheen
 - 2) Sherwin Williams – Emerald Exterior Acrylic

END OF SECTION 09 91 00