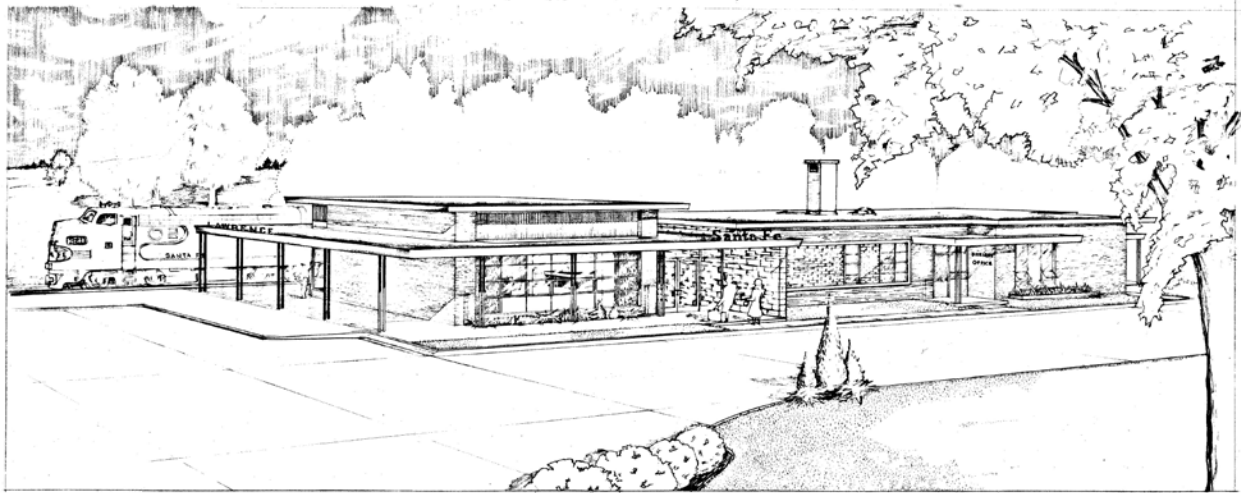


SANTA FE STATION

KDOT Grant No. 23 TE-0373-01



PRESERVATION PROJECT

413 E 7TH Street - Lawrence, Kansas

Project Manual

Issue Date: July 15, 2015



City of Lawrence

<p>KANSAS DEPT. OF TRANSPORTATION Dwight D. Eisenhower State Office Building 700 S.W. Harrison Street Topeka, KS 66603-3745</p>	<p>CITY OF LAWRENCE City Hall, City Manager's Office 6 E 6th Street Lawrence, KS 66044</p>
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DGM Consultants, P.A.
Structural Engineering and Masonry Consulting



SERVICE. THE BARTLETT & WEST WAY.



ARCHITECTS
ENVIRONMENTAL CONSULTANTS
GRANT ADMINISTRATORS

920 Massachusetts, Suite 2
Lawrence, KS 66044

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section includes:
 - 1. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Phased construction.
 - 4. Access to site.
 - 5. Coordination with occupants.
 - 6. Work restrictions.
 - 7. Specification and drawing conventions.

1.3 PROJECT INFORMATION

- A. Project Identification: **Santa Fe Train Station.**
 - 1. Project Location: **413 East 7th Street, Lawrence, Kansas.**
- B. Owner: **City of Lawrence.**
 - 1. City of Lawrence Representative: **Dianne Stoddard, Assistant City Manager, 6 East 6th Street, Lawrence, KS Ph. 785-832-3400.**
- C. Architect: **Hernly Associates, Inc., 920 Massachusetts St., Suite #2, Lawrence, KS, 66044-2868, Ph. 785-749-5806.**
- D. Other Consultants: The Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:
 - 1. Structural Engineer: **DGM Consultants, 10251 Goddard St., Overland Park, KS 66214, 913-894-2048**
 - 2. Mechanical, Electrical, and Plumbing Engineer: **Hughes Consulting Engineering, 714 Vermont Street, Lawrence, KS, 66044, 785-842-2292**
 - 3. Civil Engineer: **Bartlett and West, 544 Columbia Drive, Lawrence, KS, 66049, 785-749-9452**

1.4 WORK COVERED BY CONTRACT DOCUMENTS

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

1. **Accessibility Project:** Interior and exterior renovations required to bring the building into ADA compliance. This includes restroom renovations, replacement of doors and hardware, and installation of new exterior paving and ramps along the south side of the building.
2. **Roofing Project:** The replacement of the Roofing materials, the addition and replacement of roof drains and skylight. This also includes the restoration of the aluminum fascia.
3. **Exterior Restoration Project:** The cleaning and maintenance of masonry, replacement of canopy posts and repair of soffits, replacement of joint sealants, and exterior painting.
4. **Weatherization Project:** Includes storm windows at all window openings, the installation of insulation, and replacement of window glazing compound.
5. **Interior Restoration Project:** Includes cleaning and restoration of all interior finishes.
6. **Electrical Project:** Includes electrical service, lighting and distribution upgrades. Also includes new photovoltaic roof panels.
7. **HVAC Project:** Includes geothermal cooling system and geothermal/boiler heating system.
8. **Fire Suppression System Project:** Includes fire suppression system for entire building.
9. **Site Improvements Project:** Includes all improvements west and south of the building including ornamental garden and landscaping, sidewalks, curb and gutter, storm drainage, brick paving repairs, and parking lot striping. Includes all fencing east of the building along railroad sidetrack.

B. Type of Contract

1. Contract shall be as specified by Kansas Department of Transportation (KDOT) requirements.

1.5 PHASED CONSTRUCTION

A. The Work shall be completed in one phase.

1.6 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings, by the Contract limits, and as indicated by requirements of this Section.
- B. Use of Site: Limit use of Project site to work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
 - 1. Limits: Confine construction operations to areas as indicated in the Drawings. Coordinate with Owner portions of the site to use for construction staging.
 - 2. Driveways, Walkways and Entrances: Keep driveways, parking lots, and entrances serving premises clear and available to Owner, Owner's employees, BNSF Railway employees, and emergency vehicles at all times.
 - a. Schedule paving-construction at south building entry to minimize the duration that this area is not available for use.
 - b. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - c. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.
- C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.

1.7 COORDINATION WITH OCCUPANTS

- A. Partial Occupancy:
 - 1. **BNSF:** BNSF Railway staff will occupy a portion of the premises during the entire construction period, including the "Baggage Room", "Freight Office", and one "Bathroom". Cooperate with Owner and BNSF Railway staff during construction operations to minimize conflicts and facilitate usage. Perform the Work so as not to interfere with operations to the greatest extent possible. Maintain existing exits unless otherwise indicated.
 - a. **Access:** Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner, BNSF Railway staff, and authorities having jurisdiction.
 - b. **Sanitary Facilities:** Maintain access to at least one bathroom on-site for BNSF staff use throughout the entire duration of the construction period. The usable bathroom shall either be an existing bathroom prior to its rehabilitation, or shall be a bathroom in which rehabilitation work has been completed. If construction processes require temporary disconnection of the permanent plumbing systems, temporary toilet and wash facilities shall be provided by the Contractor for use by BNSF staff. Comply with requirements of authorities having jurisdiction for type, location, operation, and maintenance of fixtures and facilities.

- c. **Mechanical Service** (HVAC, Plumbing, Electrical, Phone, and Data): Do not interrupt mechanical services for the facilities unless permitted under the following conditions and then only after providing temporary services according to requirements indicated:
 - 1) Notify Owner and BNSF Railway staff not less than seven days in advance of proposed mechanical systems interruptions.
 - 2) Obtain Owner's written permission before proceeding with mechanical systems interruptions.
 - d. Provide not less than 72 hours' notice to Owner and BNSF Railway staff of activities that will affect operations.
2. **AMTRAK:** AMTRAK patrons will utilize a portion of the premises during the entire construction period, including the "Platform" north of the building, the "Waiting Room", and one "Bathroom". AMTRAK service currently utilizes the facility two times daily, 11:15 P.M. to 12:15 A.M. and 5:15 A.M. to 6:15 P.M. Cooperate with Owner and AMTRAK staff during construction operations to minimize conflicts and facilitate usage. Perform the Work so as not to interfere with operations to the greatest extent possible. Maintain existing exits unless otherwise indicated.
- a. **Parking:** The primary parking areas for AMTRAK patrons are the asphalt parking lot and brick parking lot west of the station. The asphalt lot is being removed as part of this project; the Contractor shall maintain this lot for AMTRAK patron use for as long as possible into the construction period. Some aspects of the construction will affect the usability of the brick parking lot; the Contractor shall sequence construction processes to minimize effects on the brick parking lot, and at no times shall the lot be unusable for AMTRAK patrons during the construction period.
 - b. **Temporary Parking:** The Owner is making arrangements for additional temporary parking for AMTRAK patrons either off-site, or on the eastern portion of the site. The Contractor shall cooperate with the Owner's implementation of temporary parking arrangements.
 - c. **Access:** Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner, BNSF Railway staff, and authorities having jurisdiction.
 - d. **Sanitary Facilities:** Maintain access to at least one bathroom on-site for AMTRAK patron use throughout the entire duration of the construction period. The usable bathroom shall either be an existing bathroom prior to its rehabilitation, or shall be a bathroom in which rehabilitation work has been completed.
 - e. **Mechanical Service** (HVAC, Plumbing, Electrical, Phone, and Data): Do not interrupt mechanical services for the facilities unless permitted under the following conditions and then only after providing temporary services according to requirements indicated:
 - 1) Notify Owner not less than seven days in advance of proposed mechanical systems interruptions.
 - 2) Obtain Owner's written permission before proceeding with mechanical systems interruptions.

- f. Provide not less than 72 hours' notice to Owner and BNSF Railway staff of activities that will affect operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.8 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
1. A BNSF flagman shall be provided, at the Contractor's expense, when construction processes meet the criteria for such requirement.
 2. Comply with limitations on use of public streets and other requirements of authorities having jurisdiction.
- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
1. Notify Owner and BNSF Railway staff not less than seven days in advance of proposed utility interruptions.
 2. Obtain Owner's written permission before proceeding with utility interruptions.
- C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to occupancy with Owner and BNSF Railway staff.
1. Notify Owner and BNSF Railway staff not less than seven days in advance of proposed disruptive operations.
 2. Obtain Owner's written permission before proceeding with disruptive operations.
- D. Controlled Substances: Use of tobacco products and other controlled substances within the existing building is not permitted.

1.9 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.
 2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
- B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- C. Drawing Coordination: Requirements for materials and products identified on the Drawings are described in detail in the Specifications. One or more of the following are used on the Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
 2. Abbreviations: Materials and products are identified by abbreviations scheduled on Drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012300 - ALTERNATES

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 alternates.

1.3 DEFINITIONS

- A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.
 - 1. Alternates described in this Section are part of the Work only if enumerated in the Agreement.
 - 2. The cost or credit for each alternate is the net addition to the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
 - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.

- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

A. **Alternate No. 1:** Interior Restoration

1. Base Bid: Exclude work as indicated on Sheets:
 - a. 1.I.0 – FINISH FLOOR PLAN
 - b. 3.I.0 – INTERIOR ELEVATIONS
 - c. 4.I.0 – REFLECTED CEILING PLAN
 - d. 6.I.0 – INTERIOR PHOTO KEY
 - e. 6.I.1 – INTERIOR PHOTO KEY
 - f. 7.A.0 – DOOR SCHEDULE (REFER TO SCHEDULE ON 7.A.0 FOR MORE DETAIL)
 - g. 7.I.0 – FINISH SCHEDULE
 - h. 7.I.1 – FINISH SCHEDULE.

2. Alternate: Include work as indicated on Sheets:
 - a. 1.I.0 – FINISH FLOOR PLAN
 - b. 3.I.0 – INTERIOR ELEVATIONS
 - c. 4.I.0 – REFLECTED CEILING PLAN
 - d. 6.I.0 – INTERIOR PHOTO KEY
 - e. 6.I.1 – INTERIOR PHOTO KEY
 - f. 7.A.0 – DOOR SCHEDULE (REFER TO SCHEDULE ON 7.A.0 FOR MORE DETAIL)
 - g. 7.I.0 – FINISH SCHEDULE
 - h. 7.I.1 – FINISH SCHEDULE.

B. **Alternate No. 2:** Interior Roof Insulation.

1. Base Bid: Exclude work as indicated on Sheet 5.W.1 – ROOF INSULATION DETAILS
2. Alternate: Include work as indicated on Sheet 5.W.1 – ROOF INSULATION DETAILS

END OF SECTION 012300

SECTION 012900 - SUPPLEMENTAL PAYMENT PROCEDURES FOR BUILDING CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment related to building construction.

1.3 SCHEDULE OF VALUES FOR BUILDING CONSTRUCTION WORK

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.

- 1. Correlate line items in the schedule of values with other required administrative forms and schedules, including the following:
 - a. Application for Payment forms with continuation sheets.
 - b. Submittal schedule.
- 2. Submit the schedule of values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- 3. Subschedules for Phased Work: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
- 4. Subschedules for Separate Elements of Work: Where the Contractor's construction schedule defines separate elements of the Work, provide subschedules showing values correlated with each element.

- B. Format and Content: Use the Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

- 1. Identification: Include the following Project identification on the schedule of values:
 - a. Project name and location.
 - b. Name of Architect.
 - c. Architect's project number.
 - d. Contractor's name and address.
 - e. Date of submittal.

2. Arrange schedule of values consistent with format of AIA Document G703.
3. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
 - a. Related Specification Section or Division.
 - b. Description of the Work.
 - c. Name of subcontractor.
 - d. Name of manufacturer or fabricator.
 - e. Name of supplier.
 - f. Change Orders (numbers) that affect value.
 - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
 - 1) Labor.
 - 2) Materials.
 - 3) Equipment.
4. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide multiple line items for principal subcontract amounts in excess of five percent of Contract Sum.
5. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
6. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
 - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance.
7. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
8. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
9. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
 - a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.
10. Schedule Updating: Update and resubmit the schedule of values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

- 1.4 APPLICATIONS FOR PAYMENT FOR BUILDING CONSTRUCTION WORK
- A. Applications for Payment shall conform to Division 100 Specifications.
 - B. Applications for Payment for building construction work shall also conform to the provisions of this section.
 - C. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
 - 1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
 - D. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
 - E. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
 - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
 - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
 - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
 - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
 - F. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored on-site, but not yet installed. Items stored off-site may not be included in Application for Payment amounts.
 - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
 - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
 - 3. Provide summary documentation for stored materials indicating the following:
 - a. Materials previously stored and included in previous Applications for Payment.
 - b. Work completed for this Application utilizing previously stored materials.
 - c. Additional materials stored with this Application.
 - d. Total materials remaining stored, including materials with this Application.
 - G. Transmittal: Submit three signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 48 hours. One copy shall include waivers of lien and similar attachments if required.

1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.
- H. Waivers of Mechanic's Lien: Shall conform to Division 100 specifications.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
 2. Schedule of values.
 3. Contractor's construction schedule (preliminary if not final).
 4. Products list (preliminary if not final).
 5. Schedule of unit prices.
 6. Submittal schedule (preliminary if not final).
 7. List of Contractor's staff assignments.
 8. List of Contractor's principal consultants.
 9. Copies of building permits.
 10. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
 11. Initial progress report.
 12. Report of preconstruction conference.
- J. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
 2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- K. Final Payment Application: Submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
1. Evidence of completion of Project closeout requirements.
 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
 3. Updated final statement, accounting for final changes to the Contract Sum.
 4. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
 5. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012900

SECTION 013100 – SUPPLEMENTAL PROJECT MANAGEMENT AND COORDINATION FOR BUILDING CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
 - 1. Administrative and supervisory personnel.
 - 2. Requests for Information (RFIs).
 - 3. Project meetings.

1.3 DEFINITIONS

- A. RFI: Request from Owner, Architect, or Contractor seeking information from each other during construction.

1.4 KEY PERSONNEL

- A. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as standbys in the absence of individuals assigned to Project.

1.5 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
 - 1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
 - 2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.
 2. Project number.
 3. Date.
 4. Name of Contractor.
 5. Name of Architect.
 6. RFI number, numbered sequentially.
 7. RFI subject.
 8. Specification Section number and title and related paragraphs, as appropriate.
 9. Drawing number and detail references, as appropriate.
 10. Field dimensions and conditions, as appropriate.
 11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
 12. Contractor's signature.
 13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
 - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: AIA Document G716.
- D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven working days for Architect's response for each RFI. RFIs received by Architect after 3:00 p.m. will be considered as received the following working day.
1. The following RFIs will be returned without action:
 - a. Requests for approval of submittals.
 - b. Requests for approval of substitutions.
 - c. Requests for coordination information already indicated in the Contract Documents.
 - d. Requests for adjustments in the Contract Time or the Contract Sum.
 - e. Requests for interpretation of Architect's actions on submittals.
 - f. Incomplete RFIs or inaccurately prepared RFIs.
 2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
 3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
 - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 5 days of receipt of the RFI response.
- E. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

- F. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log monthly. Include the following:
1. Project name.
 2. Name and address of Contractor.
 3. Name and address of Architect.
 4. RFI number including RFIs that were dropped and not submitted.
 5. RFI description.
 6. Date the RFI was submitted.
 7. Date Architect's response was received.
 8. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.6 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site, unless otherwise indicated.
1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
 2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
 3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. **Preconstruction Conference:** Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
1. Conduct the conference to review responsibilities and personnel assignments.
 2. Attendees: Authorized representatives of Owner, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
 3. Agenda: Discuss items of significance that could affect progress, including the following:
 - a. Tentative construction schedule.
 - b. Phasing.
 - c. Critical work sequencing and long-lead items.
 - d. Designation of key personnel and their duties.
 - e. Lines of communications.
 - f. Procedures for processing field decisions and Change Orders.
 - g. Procedures for RFIs.
 - h. Procedures for testing and inspecting.
 - i. Procedures for processing Applications for Payment.
 - j. Distribution of the Contract Documents.

- k. Submittal procedures.
 - l. Preparation of record documents.
 - m. Use of the premises and existing building.
 - n. Work restrictions.
 - o. Owner's occupancy requirements.
 - p. Responsibility for temporary facilities and controls.
 - q. Procedures for moisture and mold control.
 - r. Procedures for disruptions and shutdowns.
 - s. Construction waste management and recycling.
 - t. Parking availability.
 - u. Office, work, and storage areas.
 - v. Equipment deliveries and priorities.
 - w. First aid.
 - x. Security.
 - y. Progress cleaning.
4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. **Progress Meetings:** Conduct progress meetings at **biweekly** intervals.

- 1. Coordinate dates of meetings with preparation of payment requests.
- 2. Attendees: In addition to representatives of Owner and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
- 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
 - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
 - 1) Review schedule for next period.
 - b. Review present and future needs of each entity present, including the following:
 - 1) Interface requirements.
 - 2) Sequence of operations.
 - 3) Status of submittals.
 - 4) Deliveries.
 - 5) Off-site fabrication.
 - 6) Access.
 - 7) Site utilization.
 - 8) Temporary facilities and controls.

- 9) Progress cleaning.
 - 10) Quality and work standards.
 - 11) Status of correction of deficient items.
 - 12) Field observations.
 - 13) Status of RFIs.
 - 14) Status of proposal requests.
 - 15) Pending changes.
 - 16) Status of Change Orders.
 - 17) Pending claims and disputes.
 - 18) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.
- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013300 – SUPPLEMENTAL SUBMITTAL PROCEDURES FOR BUILDING CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other miscellaneous submittals.

1.3 DEFINITIONS

- A. Action Submittals: Written and graphic information that requires Architect's responsive action.
- B. Informational Submittals: Written information that does not require Architect's approval. Submittals may be rejected for not complying with requirements.

1.4 SUBMITTAL PROCEDURES

- A. General: Electronic copies of CAD Drawings of the Contract Drawings and specifications will be provided by Architect for Contractor's use in preparing submittals.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
 - 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 parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
 - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow enough time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal.
 - 1. Initial Review: Allow [15] fifteen days for initial review of each submittal. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
 - 2. Allow [15] fifteen days for processing each resubmittal.

3. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing.
- D. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
 2. Provide a space approximately 4 by 5 inches on label or beside title block to record Contractor's review and approval markings and action taken by Architect.
 3. Include the following information on label for processing and recording action taken:
 - a. Project name.
 - b. Date.
 - c. Name and address of Architect.
 - d. Name and address of Contractor.
 - e. Name and address of subcontractor.
 - f. Name and address of supplier.
 - g. Name of manufacturer.
 - h. Unique identifier, including revision number.
 - i. Number and title of appropriate Specification Section.
 - j. Drawing number and detail references, as appropriate.
 - k. Other necessary identification.
- E. Deviations: Highlight, encircle, or otherwise identify deviations from the Contract Documents on submittals.
- F. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- G. Use for Construction: Use only final submittals with mark indicating action taken by Architect in connection with construction.

PART 2 - PRODUCTS

2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
1. Number of Copies: Submit copies of each submittal, as follows, unless otherwise indicated:
 - a. Initial Submittal: Submit a preliminary single copy of each submittal where selection of options, color, pattern, texture, or similar characteristics is required. Architect will return submittal with options selected.

- b. Final Submittal: Submit [5] five copies, unless copies are required for operation and maintenance manuals. Architect will return [2] two copies. Mark up and retain one returned copy as a Project Record Document.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
 1. If information must be specially prepared for submittal because standard printed data are not suitable for use, submit as Shop Drawings, not as Product Data.
 2. Mark each copy of each submittal to show which products and options are applicable.
 3. Include the following information, as applicable:
 - a. Manufacturer's written recommendations.
 - b. Manufacturer's product specifications.
 - c. Manufacturer's installation instructions.
 - d. Standard color charts.
 - e. Manufacturer's catalog cuts.
 - f. Operational range diagrams.
 - g. Mill reports.
 - h. Standard product operating and maintenance manuals.
 - i. Compliance with recognized trade association standards.
 - j. Compliance with recognized testing agency standards.
 - k. Application of testing agency labels and seals.
 - l. Notation of coordination requirements.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
 1. Preparation: Include the following information, as applicable:
 - a. Dimensions.
 - b. Identification of products.
 - c. Fabrication and installation drawings.
 - d. Roughing-in and setting diagrams.
 - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
 - f. Shopwork manufacturing instructions.
 - g. Templates and patterns.
 - h. Schedules.
 - i. Design calculations.
 - j. Compliance with specified standards.
 - k. Notation of coordination requirements.
 - l. Notation of dimensions established by field measurement.
 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches (215 by 280 mm) but no larger than 30 by 40 inches (750 by 1000 mm).
 3. Number of Copies: Submit [5] five copies of each submittal, unless copies are required for operation and maintenance manuals. Architect will return [2] two copies. Mark up and retain one returned print as a Project Record Drawing.

- D. Samples: Prepare physical units of materials or products, including the following:
1. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from the same material to be used for the Work, cured and finished in manner specified, and physically identical with the product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
 2. Preparation: Mount, display, or package Samples in manner specified to facilitate review of qualities indicated. Prepare Samples to match Architect's sample where so indicated. Attach label on unexposed side that includes the following:
 - a. Generic description of Sample.
 - b. Product name or name of manufacturer.
 - c. Sample source.
 3. Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, provide the following:
 - a. Size limitations.
 - b. Compliance with recognized standards.
 - c. Availability.
 - d. Delivery time.
 4. 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 final submittal and actual component as delivered and installed.
 - a. If variation in color, pattern, texture, or other characteristic is inherent in the product represented by a Sample, submit at least [3] three sets of paired units that show approximate limits of the variations.
 - b. Refer to individual Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation, and similar construction characteristics.
 5. Number of Samples for Initial Selection: Submit [1] one full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
 - a. Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
- E. Product Schedule or List: Prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Type of product. Include unique identifier for each product.
 2. Number and name of room or space.
 3. Location within room or space.
- F. Application for Payment: Comply with "General Conditions of the Contract for Construction".
- G. Schedule of Values: Comply with "General Conditions of the Contract for Construction".
- H. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. [Use CSI Form 1.5A.] Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
 2. Number and title of related Specification Section(s) covered by subcontract.
 3. Drawing number and detail references, as appropriate, covered by subcontract.

2.2 INFORMATIONAL SUBMITTALS

- A. General: Prepare and submit Informational Submittals required by other Specification Sections.
1. Number of Copies: Submit [3] three copies of each submittal, unless otherwise indicated. Architect will not return copies.
 2. Certificates and Certifications: Provide a notarized statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
- B. Contractor's Construction Schedule: Comply with "General Conditions of the Contract for Construction".
- C. Material Test Reports: Prepare reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements.
- D. Maintenance Data: Prepare written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements in Division 1 Section "Operation and Maintenance Data."
- E. Manufacturer's Instructions: Prepare written or published information that documents manufacturer's recommendations, guidelines, and procedures for installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
1. Preparation of substrates.
 2. Required substrate tolerances.
 3. Sequence of installation or erection.

4. Required installation tolerances.
5. Required adjustments.
6. Recommendations for cleaning and protection.

PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW

- A. Review each submittal and check for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

- A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or modifications required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
- C. Informational Submittals: Architect will review each submittal and will not return it, or will reject and return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- D. Submittals not required by the Contract Documents will not be reviewed and may be discarded.

END OF SECTION 013300

SECTION 013591 - HISTORIC TREATMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes general protection and treatment procedures for designated historic spaces, areas, rooms, and surfaces in Project.

1.3 DEFINITIONS

- A. Consolidate: To strengthen loose or deteriorated materials in place.
- B. Design Reference Sample: A sample that represents the Architect's prebid selection of work to be matched; it may be existing work or work specially produced for the Project.
- C. Dismantle: To disassemble or detach a historic item from a surface, or a nonhistoric item from a historic surface, using gentle methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.
- D. Historic: Spaces, areas, rooms, surfaces, materials, finishes, and overall appearance that are important to the successful **preservation, rehabilitation, and restoration** as determined by Architect.
- E. Match: To blend with adjacent construction and manifest no apparent difference in material type, species, cut, form, detail, color, grain, texture, or finish; as approved by Architect.
- F. Refinish: To remove existing finishes to base material and apply new finish to match original, or as otherwise indicated.
- G. Reinstall: To protect removed or dismantled item, repair and clean it as indicated for reuse, and reinstall it in original position, or where indicated.
- H. Remove: To take down or detach a nonhistoric item located within a historic space, area, or room, using methods and equipment to prevent damage to historic items and surfaces; disposing of items unless indicated to be salvaged or reinstalled.

- I. Repair: To correct damage and defects, retaining existing materials, features, and finishes while employing as little new material as possible. This includes patching, piecing-in, splicing, consolidating, or otherwise reinforcing or upgrading materials.
- J. Replace: To remove, duplicate, and reinstall entire item with new material. The original item is the pattern for creating duplicates unless otherwise indicated.
- K. Replicate: To reproduce in exact detail, materials, and finish unless otherwise indicated.
- L. Reproduce: To fabricate a new item, accurate in detail to the original, and from either the same or a similar material as the original, unless otherwise indicated.
- M. Restore: To consolidate, replicate, reproduce, repair, and refinish as required to achieve the indicated results.
- N. Retain: To keep existing items that are not to be removed or dismantled.
- O. Reversible: New construction work, treatments, or processes that can be removed or undone in the future without damaging historic materials unless otherwise indicated.
- P. Salvage: To protect removed or dismantled items and deliver them to Owner.
- Q. Stabilize: To provide structural reinforcement of unsafe or deteriorated items while maintaining the essential form as it exists at present; also, to reestablish a weather-resistant enclosure.
- R. Strip: To remove existing finish down to base material unless otherwise indicated.

1.4 COORDINATION

- A. Historic Treatment Subschedule: A construction schedule coordinating the sequencing and scheduling of historic treatment work for entire Project, including each activity to be performed in historic spaces, areas, and rooms, and on historic surfaces; and based on Contractor's Construction Schedule. Secure time commitments for performing critical construction activities from separate entities responsible for historic treatment work.
 - 1. Schedule construction operations in sequence required to obtain best historic treatment results.
 - 2. Coordinate sequence of historic treatment work activities to accommodate the following:
 - a. Owner's continuing occupancy of portions of existing building.
 - b. Owner's partial occupancy of completed Work.
 - c. Other known work in progress.
 - d. Tests and inspections.
 - 3. Detail sequence of historic treatment work, with start and end dates.
 - 4. Utility Services: Indicate how long utility services will be interrupted. Coordinate shutoff, capping, and continuation of utility services.

- B. Public Circulation: Coordinate historic treatment work with public circulation patterns at Project site. Some work is near public circulation patterns and active railroad track. Public circulation patterns cannot be closed off entirely, and in places can be only temporarily redirected around small areas of work. Railroad traffic will not be stopped. Plan and execute the Work accordingly.

1.5 PROJECT MEETINGS FOR HISTORIC TREATMENT

- A. Preliminary Historic Treatment Conference: Before starting historic treatment work, conduct conference at Project site.
 - 1. Attendees: In addition to representatives of Owner, KDOT, BNSF, Architect, and Contractor, historic treatment specialists, chemical-cleaner manufacturer, and installers whose work interfaces with or affects historic treatment shall be represented at the meeting.
 - 2. Agenda: Discuss items of significance that could affect progress of historic treatment work, including review of the following:
 - a. Historic Treatment Subschedule: Discuss and finalize; verify availability of materials, historic treatment specialists' personnel, equipment, and facilities needed to make progress and avoid delays.
 - b. Fire-prevention plan.
 - c. Governing regulations.
 - d. Areas where existing construction is to remain and the required protection.
 - e. Hauling routes.
 - f. Sequence of historic treatment work operations.
 - g. Storage, protection, and accounting for salvaged and specially fabricated items.
 - h. Existing conditions, staging, and structural loading limitations of areas where materials are stored.
 - i. Qualifications of personnel assigned to historic treatment work and assigned duties.
 - j. Requirements for extent and quality of work, tolerances, and required clearances.
 - k. Methods and procedures related to historic treatments, including product manufacturers' written instructions and precautions regarding historic treatment procedures and their effects on materials, components, and vegetation.
 - l. Embedded work such as flashings and lintels, special details, collection of wastes, protection of occupants and the public, and condition of other construction that affect the Work or will affect the work.
 - 3. Reporting: Record conference results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from conference.
- B. Coordination Meetings: Conduct coordination meetings specifically for historic treatment work as part of regular progress meetings and preinstallation conferences.
 - 1. Attendees: In addition to representatives of Owner, KDOT, BNSF, Architect, and Contractor, each historic treatment specialist, supplier, installer, and other entity

concerned with progress or involved in planning, coordination, or performance of historic treatment work activities shall be represented at these meetings. All participants at conference shall be familiar with Project and authorized to conclude matters relating to historic treatment work.

2. Agenda: Review and correct or approve minutes of previous coordination meeting. Review other items of significance that could affect progress of historic treatment work. Include topics for discussion as appropriate to status of Project.
 - a. Review present and future needs of each entity present, including review items listed in the "Preliminary Historic Treatment Conference" Paragraph above and the following:
 - 1) Interface requirements of historic treatment work with other Project Work.
 - 2) Status of submittals for historic treatment work.
 - 3) Access to historic treatment work.
 - 4) Effectiveness of fire-prevention plan.
 - 5) Quality and work standards of historic treatment work.
 - 6) Change Orders for historic treatment work.
3. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.6 MATERIALS OWNERSHIP

- A. Historic items, relics, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, antiques, and other items of interest or value to Owner that may be encountered or uncovered during the Work, regardless of whether they were previously documented, remain Owner's property.
 1. Carefully dismantle and salvage each item or object and protect it from damage, then promptly deliver it to Owner where directed.

1.7 INFORMATIONAL SUBMITTALS

1.8 QUALITY ASSURANCE

- A. Safety and Health Standard: Comply with ANSI/ASSE A10.6.

1.9 STORAGE AND HANDLING OF HISTORIC MATERIALS

- A. Salvaged Historic Materials:
 1. Clean loose dirt and debris from salvaged historic items unless more extensive cleaning is indicated.
 2. Pack or crate items after cleaning; cushion against damage during handling. Label contents of containers.

-
3. Store items in a secure area until picked up by Owner.
- B. Historic Materials for Reinstallation:
1. Repair and clean historic items for reuse as indicated.
 2. Pack or crate items after cleaning and repairing; cushion against damage during handling. Label contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment unless otherwise indicated. Provide connections, supports, and miscellaneous materials to make item functional for use indicated.
- C. Existing Historic Materials to Remain: Protect construction indicated to remain against damage and soiling from construction work. Where permitted by Architect, items may be dismantled and taken to a suitable, protected storage location during construction work and reinstalled in their original locations after historic treatment and construction work in the vicinity is complete.
- D. Storage: Catalog and store historic items within a weathertight enclosure where they are protected from moisture, weather, condensation, and freezing temperatures.
1. Identify each item with a nonpermanent mark to document its original location. Indicate original locations on plans, elevations, sections, or photographs by annotating the identifying marks.
 2. Secure stored materials to protect from theft.
 3. Control humidity so that it does not exceed 85 percent. Maintain temperatures 5 deg F (3 deg C) or more above the dew point.
- E. Storage Space:
1. Owner will arrange for limited on-site location(s) for free storage of historic material. This storage space includes security and climate control for stored material.
 2. Arrange for off-site locations for storage and protection of historic material that cannot be stored and protected on-site.
- 1.10 FIELD CONDITIONS
- A. Size Limitations in Historic Spaces: Materials, products, and equipment used for performing the Work and for transporting debris, materials, and products shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 6 inches or more.

PART 2 - PRODUCTS - (Not Used)

PART 3 - EXECUTION

3.1 PROTECTION, GENERAL

- A. Protect persons, motor vehicles, surrounding surfaces of building, building site, plants, and surrounding buildings from harm resulting from historic treatment procedures.
 - 1. Use only proven protection methods, appropriate to each area and surface being protected.
 - 2. Provide temporary barricades, barriers, and directional signage to exclude the public from areas where historic treatment work is being performed.
 - 3. Erect temporary barriers to form and maintain fire-egress routes that meet Americans with Disabilities Act Accessibility Guidelines (ADAAG) & Public Rights-Of-Way Accessibility Guidelines (PROWAG).
 - 4. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during historic treatment work.
 - 5. Contain dust and debris generated by historic treatment work, and prevent it from reaching the public or adjacent surfaces.
 - 6. Provide shoring, bracing, and supports as necessary. Do not overload structural elements.
 - 7. Protect floors and other surfaces along hauling routes from damage, wear, and staining.

- B. Temporary Protection of Historic Materials:
 - 1. Protect existing historic materials with temporary protections and construction. Do not remove existing materials unless otherwise indicated.
 - 2. Do not attach temporary protection to historic surfaces except as indicated as part of the historic treatment program and approved by Architect.

- C. Comply with each product manufacturer's written instructions for protections and precautions. Protect against adverse effects of products and procedures on people and adjacent materials, components, and vegetation.

- D. Utility and Communications Services:
 - 1. Notify Owner, Architect, authorities having jurisdiction, and entities owning or controlling wires, conduits, pipes, and other services affected by historic treatment work before commencing operations.
 - 2. Disconnect and cap pipes and services as required by authorities having jurisdiction, as required for historic treatment work.
 - 3. Maintain existing building services and utilities as indicated in section 011000 – Summary.

- E. Existing Drains: Prior to the start of work in an area, test drainage system to ensure that it is functioning properly. Notify Architect immediately of inadequate drainage or

blockage. Do not begin work in an area until the drainage system is functioning properly.

1. Prevent solids such as stone or mortar residue or other debris from entering the drainage system. Clean out drains and drain lines that become sluggish or blocked by sand or other materials resulting from historic treatment work.
2. Protect drains from pollutants. Block drains or filter out sediments, allowing only clean water to pass.

3.2 PROTECTION FROM FIRE

A. General: Follow fire-prevention plan and the following:

1. Remove and keep area free of combustibles, including rubbish, paper, waste, and chemicals, unless necessary for the immediate work.
2. Prohibit smoking by all persons within Project work and staging areas.

B. Heat-Generating Equipment and Combustible Materials: Comply with the following procedures while performing work with heat-generating equipment or combustible materials, including welding, torch-cutting, soldering, brazing, removing paint with heat, or other operations where open flames or implements using high heat or combustible solvents and chemicals are anticipated:

1. Obtain Owner's approval for operations involving use of open-flame or welding or other high-heat equipment. Notify Owner at least 72 hours before each occurrence, indicating location of such work.
2. As far as practicable, restrict heat-generating equipment to shop areas or outside the building.
3. Do not perform work with heat-generating equipment in or near rooms or in areas where flammable liquids or explosive vapors are present or thought to be present. Use a combustible gas indicator test to ensure that the area is safe.
4. Use fireproof baffles to prevent flames, sparks, hot gases, or other high-temperature material from reaching surrounding combustible material.
5. Prevent the spread of sparks and particles of hot metal through open windows, doors, holes, and cracks in floors, walls, ceilings, roofs, and other openings.

C. Fire Extinguishers and Rag Buckets: Maintain fire extinguishers and rag buckets for disposal of rags with combustible liquids. Maintain each as suitable for the type of fire risk in each work area. Ensure that nearby personnel are trained in fire-extinguisher use.

3.3 PROTECTION DURING APPLICATION OF CHEMICALS

A. Protect motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm or damage resulting from applications of chemicals and adhesives.

B. Cover adjacent surfaces with protective materials that are proved to resist chemicals selected for Project unless chemicals being used will not damage adjacent surfaces as indicated in historic treatment program. Use covering materials and masking agents

that are waterproof and UV resistant and that will not stain or leave residue on surfaces to which they are applied. Apply protective materials according to manufacturer's written instructions. Do not apply liquid masking agents or adhesives to painted or porous surfaces. When no longer needed, promptly remove protective materials.

- C. Do not apply chemicals during winds of sufficient force to spread them to unprotected surfaces.
- D. Neutralize alkaline and acid wastes and legally dispose of off Owner's property.
- E. Collect and dispose of runoff from chemical operations by legal means and in a manner that prevents soil contamination, soil erosion, undermining of paving and foundations, damage to landscaping, or water penetration into building interior.

3.4 GENERAL HISTORIC TREATMENT

- A. Historic treatment work shall be performed by qualified historic treatment specialists, as defined in the specifications for the type of work being performed.
- B. Ensure that supervisory personnel are present when historic treatment work begins and during its progress.
- C. Perform surveys of Project Site as the Work progresses to detect hazards resulting from historic treatment procedures.
- D. Follow the procedures in subparagraphs below unless otherwise indicated:
 - 1. Retain as much existing material as possible; repair and consolidate rather than replace.
 - 2. Use additional material or structure to reinforce, strengthen, prop, tie, and support existing material or structure.
 - 3. Use reversible processes wherever possible.
 - 4. Use historically accurate repair and replacement materials and techniques unless otherwise indicated.
- E. Notify Architect of visible changes in the integrity of material or components whether from environmental causes including biological attack, UV degradation, freezing, or thawing or from structural defects including cracks, movement, or distortion.
 - 1. Do not proceed with the work in question until directed by Architect.
- F. Where missing features are indicated to be repaired or replaced, provide work with appearance based on accurate duplications rather than on conjecture, subject to approval of Architect.
- G. Where work requires existing features to be removed or dismantled and reinstalled, perform these operations without damage to the material itself, to adjacent materials, or to the substrate.

- H. Identify new and replacement materials and features with permanent marks hidden in the completed Work to distinguish them from original materials. Record a legend of identification marks and the locations of the items on record Drawings.

END OF SECTION 013591

SECTION 015000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Division 100 specification sections supersede requirements of this section.

1.3 USE CHARGES

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Architect, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

1.4 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

1.5 PROJECT CONDITIONS

- A. Temporary Use of Permanent Facilities: Engage installer of each permanent service to assume responsibility for operation, maintenance, and protection of each permanent service during its use as a construction facility before Owner's acceptance, regardless of previously assigned responsibilities.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. **Buy America:** Products in this section are subject to Buy America coverage.
- B. Chain-Link Fencing: Minimum **2-inch (50-mm)**, **0.148-inch- (3.8-mm-)** thick, galvanized steel, chain-link fabric fencing; minimum **6 feet (1.8 m)** high with galvanized steel pipe posts; minimum **2-3/8-inch- (60-mm-)** OD line posts and **2-7/8-inch- (73-mm-)** OD corner and pull posts, with **1-5/8-inch- (42-mm-)** OD top rails.
- C. Portable Chain-Link Fencing: Minimum **2-inch (50-mm)**, **0.148-inch- (3.8-mm-)** thick, galvanized steel, chain-link fabric fencing; minimum **6 feet (1.8 m)** high with galvanized steel pipe posts; minimum **2-3/8-inch- (60-mm-)** OD line posts and **2-7/8-inch- (73-mm-)** OD corner and pull posts, with **1-5/8-inch- (42-mm-)** OD top and bottom rails. Provide galvanized steel bases for supporting posts.
- D. Insulation: Unfaced mineral-fiber blanket, manufactured from glass, slag wool, or rock wool; with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
 - 1. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate project meetings specified in other Division 01 Sections. Keep office clean and orderly.

2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
 - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
 - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
- D. Heating: Provide temporary heating required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
- E. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
 - 1. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust containment devices.
 - 2. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
 - 1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.

- G. Electric Power Service: Connect temporary service to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
 - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- I. Telephone Service: Provide superintendent with cellular telephone.

3.3 SUPPORT FACILITIES INSTALLATION

- A. General: Comply with the following:
 - 1. Provide construction for temporary offices, shops, and sheds located convenient to construction site
 - 2. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction.
 - 1. Protect existing site improvements to remain including curbs, pavement, and utilities.
 - 2. Maintain access for fire-fighting equipment and access to fire hydrants.
- C. Parking: Use designated areas of Owner's existing parking areas for construction personnel.
- D. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
 - 1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties nor endanger permanent Work or temporary facilities.
 - 2. Remove snow and ice as required to minimize accumulations.
- E. Project Identification and Temporary Signs: Prepare Project identification and other signs in sizes indicated. Install signs where indicated to inform public and persons seeking entrance to Project. Do not permit installation of unauthorized signs.
 - 1. Engage an experienced sign painter to apply graphics for Project identification signs. Comply with details indicated.
 - 2. Construct signs of exterior-type form overlay plywood in sizes and thicknesses indicated. Support on posts or framing of preservative-treated wood.
 - 3. Paint sign panel and applied graphics with exterior-grade alkyd gloss enamel over exterior primer.
 - 4. Maintain and touchup signs so they are legible at all times.

- F. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 01 Section "Execution" for progress cleaning requirements.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
 - 1. Comply with work restrictions specified in Division 01 Section "Summary."
- B. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to adjacent properties and walkways, according to erosion- and sedimentation-control Drawings.
 - 1. Verify that flows of water redirected from construction areas or generated by construction activity do not enter or cross tree- or plant- protection zones.
 - 2. Clean, repair, and restore adjoining properties and roads affected by erosion and sedimentation from the project site during the course of the project.
 - 3. Remove erosion and sedimentation controls and restore and stabilize areas disturbed during removal.
- C. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.
- D. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
 - 1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
- E. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- F. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner from fumes and noise.
 - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant plywood on construction operations side.
 - 2. Insulate partitions to control noise transmission to occupied areas.
 - 3. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
 - 4. Protect air-handling equipment.
 - 5. Provide walk-off mats at each entrance through temporary partition.

3.5 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.
- B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect as follows:
 - 1. Protect porous materials from water damage.
 - 2. Protect stored and installed material from flowing or standing water.
 - 3. Keep porous and organic materials from coming into prolonged contact with concrete.
 - 4. Remove standing water from decks.
 - 5. Keep deck openings covered or dammed.
- C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
 - 1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
 - 2. Keep interior spaces reasonably clean and protected from water damage.
 - 3. Periodically collect and remove waste containing cellulose or other organic matter.
 - 4. Discard or replace water-damaged material.
 - 5. Do not install material that is wet.
 - 6. Discard, replace or clean stored or installed material that begins to grow mold.
 - 7. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.
- D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
 - 1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
 - 2. Use permanent HVAC system to control humidity.
 - 3. Comply with manufacturer's written instructions for temperature, relative humidity, and exposure to water limits.
 - a. Hygroscopic materials that may support mold growth, including wood and gypsum-based products, that become wet during the course of construction and remain wet for 48 hours are considered defective.
 - b. Measure moisture content of materials that have been exposed to moisture during construction operations or after installation. Record daily readings over a forty-eight hour period. Identify materials containing moisture levels higher than allowed. Report findings in writing to Architect.
 - c. Remove materials that can not be completely restored to their manufactured moisture level within 48 hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

- A. Maintenance: Maintain facilities in good operating condition until removal.
 - 1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- B. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- C. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
 - 1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
 - 2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Division 01 Section "Closeout Procedures."

END OF SECTION 015000

SECTION 016000 – SUPPLEMENTAL PRODUCT REQUIREMENTS FOR BUILDING CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

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; 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.

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 Division 01 Section "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 Division 01 Section "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.
- 1.6 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 a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
 - 4. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.
 - 5. Protect stored products from damage and liquids from freezing.
- 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.
- B. Submittal Time: Comply with requirements in Division 01 Section "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.
 7. 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.
 8. 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.
- 9. 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.
- B. Visual Matching Specification: Where Specifications require "match existing", provide a product that complies with requirements and matches existing in the best way possible. 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, comply with requirements in Division 01 Section "Substitution Procedures" for proposal of product.
- C. 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 meets warranty requirements for the project.
 - 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 016000

SECTION 017300 – SUPPLEMENTAL EXECUTION REQUIRMENTS FOR BUILDING CONSTRUCTION

PART 1 - GENERAL

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
 - 1. Construction layout.
 - 2. Field engineering and surveying.
 - 3. Installation of the Work.
 - 4. Cutting and patching.
 - 5. Progress cleaning.
 - 6. Starting and adjusting.
 - 7. Protection of installed construction.
 - 8. Correction of the Work.

1.3 DEFINITIONS

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of other work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 QUALITY ASSURANCE

- A. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
 - 1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from the Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection
 - 2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as

intended or that results in increased maintenance or decreased operational life or safety.

3. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

4. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

1.6 WARRANTY

A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during installation or cutting and patching operations, by methods and with materials so as not to void existing warranties.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to the Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, and other construction affecting the Work.

- B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
 - 1. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
 - 2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
 - 3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
 - 4. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of the Contractor, submit a request for information to Architect according to requirements in Division 01 Section "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.
 - 1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
 - 2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

3. Inform installers of lines and levels to which they must comply.
4. Check the location, level and plumb, of every major element as the Work progresses.
5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.
2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- G. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
 - 1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
 - 2. Allow for building movement, including thermal expansion and contraction.
 - 3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- H. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

- A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
 - 1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.
- B. Temporary Support: Provide temporary support of work to be cut.
- C. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjacent Occupied Areas: Where interference with use of adjoining areas or interruption of free passage to adjoining areas is unavoidable, coordinate cutting and patching in accordance with requirements of Division 01 Section "Summary."

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- E. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to minimize interruption to occupied areas.
- F. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
 3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.
 4. Excavating and Backfilling: Comply with requirements in applicable Division 31 Sections where required by cutting and patching operations.
 5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
 6. Proceed with patching after construction operations requiring cutting are complete.
- G. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.
1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.
 - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
 - b. Restore damaged pipe covering to its original condition.
 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
 - a. Where patching occurs in a painted surface, prepare substrate and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition.
- H. Cleaning: Clean areas and spaces where cutting and patching are performed. Remove paint, mortar, oils, putty, and similar materials from adjacent finished surfaces.

3.7 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.
1. Comply with requirements in NFPA 241 for removal of combustible waste materials and debris.
 2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).
 3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
 - a. Utilize containers intended for holding waste materials of type to be stored.
- B. Site: Maintain Project site free of waste materials and debris.
- C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
1. Remove liquid spills promptly.
 2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.
- D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.
- E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways. Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."
- H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

- I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.
- J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- D. Manufacturer's Field Service: Comply with qualification requirements in Division 01 Section "Quality Requirements."

3.9 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

3.10 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes.
 - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

END OF SECTION 017300

SECTION 017700 – SUPPLEMENTAL CLOSEOUT PROCEDURES FOR BUILDING CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
 - 1. Substantial Completion procedures.
 - 2. Final completion procedures.
 - 3. Warranties.
 - 4. Final cleaning.

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 with 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. Advise Owner of pending insurance changeover requirements.
 - 3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
 - 4. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
 - 5. Prepare and submit Project Record Documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
 - 6. Store tools, spare parts, extra materials, and similar items in a secure location on-site for pick up by Owner. Label with manufacturer's name and model number where applicable.
 - 7. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
 - 8. Complete startup testing of systems.
 - 9. Submit test/adjust/balance records.
 - 10. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
 - 11. Advise Owner of changeover in heat and other utilities.
 - 12. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

13. Complete final cleaning requirements, including touchup painting.
14. 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 final completion, complete the following:

1. Submit a final Application for Payment according to Division 01 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.
3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.

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. Organization 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.
4. Submit list of incomplete items in the following format:
 - a. PDF electronic file.

1.6 WARRANTIES

- A. Submittal Time: Submit standard 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. Partial Occupancy: Submit properly executed standard warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize standard warranty documents into an orderly sequence based on the table of contents of the Project Manual.
 1. Bind warranties and bonds in heavy-duty, three-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. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
 3. Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide table of contents at beginning of document.
- D. Provide additional copies of each standard 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: Perform 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. Remove tools, construction equipment, machinery, and surplus material from Project site.
 - d. Remove snow and ice to provide safe access to building.
 - e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
 - f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
 - g. 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.
 - h. Remove labels that are not permanent.
 - i. 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 other required labels and identification, including mechanical and electrical nameplates.
 - j. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - k. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
 - l. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

- m. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - n. Clean ducts, blowers, and coils if units were operated without filters during construction or that display contamination with particulate matter upon inspection.
 - o. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
 - p. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste disposal requirements in Division 01 Section "Temporary Facilities and Controls."

END OF SECTION 017700

SECTION 017823 – SUPPLEMENTAL OPERATION AND MAINTENANCE DATA FOR BUILDING
CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
 - 1. Operation and maintenance documentation directory.
 - 2. Operation manuals for systems, subsystems, and equipment.
 - 3. Product maintenance manuals.
 - 4. Systems and equipment maintenance manuals.

1.3 DEFINITIONS

- A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.
- B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 CLOSEOUT SUBMITTALS

- A. Manual Content: Operations and maintenance manual content is specified in individual specification sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
 - 1. Where applicable, clarify and update reviewed manual content to correspond to modifications and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
 - 1. PDF electronic file. Assemble each manual into a composite electronically-indexed file. Submit on digital media acceptable to Architect.
 - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically-linked operation and maintenance directory.
 - b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves.
- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
 1. Correct or modify each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

- A. Organization: Include a section in the directory for each of the following:
 1. List of documents.
 2. List of systems.
 3. List of equipment.
 4. Table of contents.
- B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.
- C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.
- D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
- E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR OPERATION AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
 1. Title page.

2. Table of contents.
 3. Manual contents.
- B. Title Page: Include the following information:
1. Subject matter included in manual.
 2. Name and address of Project.
 3. Name and address of Owner.
 4. Date of submittal.
 5. Name and contact information for Contractor.
 6. Name and contact information for Construction Manager.
 7. Name and contact information for Architect.
 8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
 9. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
- F. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.
1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
 - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
 - b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.

2. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.
3. Supplementary Text: Prepared on 8-1/2-by-11-inch (215-by-280-mm) white bond paper.
4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
 - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
 - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.3 OPERATION MANUALS

- A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
 1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
 2. Performance and design criteria if Contractor is delegated design responsibility.
 3. Operating standards.
 4. Operating procedures.
 5. Operating logs.
 6. Wiring diagrams.
 7. Control diagrams.
 8. Piped system diagrams.
 9. Precautions against improper use.
 10. License requirements including inspection and renewal dates.
- B. Descriptions: Include the following:
 1. Product name and model number. Use designations for products indicated on Contract Documents.
 2. Manufacturer's name.
 3. Equipment identification with serial number of each component.
 4. Equipment function.
 5. Operating characteristics.
 6. Limiting conditions.
 7. Performance curves.
 8. Engineering data and tests.
 9. Complete nomenclature and number of replacement parts.
- C. Operating Procedures: Include the following, as applicable:
 1. Startup procedures.
 2. Equipment or system break-in procedures.
 3. Routine and normal operating instructions.
 4. Regulation and control procedures.
 5. Instructions on stopping.

6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
 2. Manufacturer's name.
 3. Color, pattern, and texture.
 4. Material and chemical composition.
 5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
 2. Types of cleaning agents to be used and methods of cleaning.
 3. List of cleaning agents and methods of cleaning detrimental to product.
 4. Schedule for routine cleaning and maintenance.
 5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
 - 1. Standard maintenance instructions and bulletins.
 - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
 - 3. Identification and nomenclature of parts and components.
 - 4. List of items recommended to be stocked as spare parts.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
 - 1. Test and inspection instructions.
 - 2. Troubleshooting guide.
 - 3. Precautions against improper maintenance.
 - 4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
 - 5. Aligning, adjusting, and checking instructions.
 - 6. Demonstration and training video recording, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
 - 1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
 - 2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
 1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.
 1. Do not use original project record documents as part of operation and maintenance manuals.
 2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."
- E. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 017839 – SUPPLEMENTAL PROJECT RECORD DOCUMENTS FOR BUILDING CONSTRUCTION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

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.

1.3 CLOSEOUT SUBMITTALS

- A. Record Drawings: Comply with the following:
 - 1. Number of Copies: Submit three sets (one original and two copies) of marked-up record prints.
- B. Record Specifications: Submit 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.

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.
 - 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. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
 - b. Accurately record information in an acceptable drawing technique.
 - c. Record data as soon as possible after obtaining it.
 - d. Record and check the markup before enclosing concealed installations.
 - e. 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. Utilize 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. 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.
 2. Format: Annotated PDF electronic file with comment function enabled.
 3. 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. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
 - 3. Note related Change Orders, record Product Data, and record Drawings where applicable.
- B. Format: Submit record Specifications as annotated PDF electronic file.

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.
 - 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.
 - 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 modifications to project record documents as they occur; do not wait until the 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 017839

SECTION 024119 - SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:
 - 1. Demolition and removal of selected portions of building or structure.
 - 2. Demolition and removal of selected site elements.
 - 3. Salvage of existing items to be reused or recycled.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 MATERIALS OWNERSHIP

- A. Historic items, relics, antiques, and similar objects and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

- A. Predemolition Conference: Conduct conference at Project site.
 - 1. Inspect and discuss condition of construction to be selectively demolished.
 - 2. Review areas where existing construction is to remain and requires protection.

1.6 FIELD CONDITIONS

- A. Owner/Tenant will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Hazardous materials, including asbestos and lead-based paint, are present in buildings and structures to be selectively demolished. A "Lead-Based Paint Inspection Report" and an "Asbestos Screening Report" are included in the appendices of this Project Manual. Examine the reports to become aware of locations where hazardous materials are present.
 - 1. Follow hazardous material remediation as indicated in the "Lead-Based Paint Inspection Report" and in the "Asbestos Screening Report".
 - 2. Do not disturb hazardous materials or items suspected of containing hazardous materials except under proper legal procedures.
- E. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings.
- F. Storage or sale of removed items or materials on-site is not permitted.
- G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.7 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials so as not to void existing warranties. Notify warrantor before proceeding.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA notification regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Building manager will arrange to shut off indicated services/systems when requested by Contractor.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.

3.3 PREPARATION

- A. Site Access and Temporary Controls: Conduct selective demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.

4. Cover and protect furniture, furnishings, and equipment that have not been removed.
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
1. Strengthen or add new supports when required during progress of selective demolition.

3.4 SELECTIVE DEMOLITION, GENERAL

- A. General: Demolish and remove existing construction only to the extent required by new construction and as indicated. Use methods required to complete the Work within limitations of governing regulations and as follows:
1. Proceed with selective demolition systematically, from higher to lower level. Complete selective demolition operations above each floor or tier before disturbing supporting members on the next lower level.
 2. Neatly cut openings and holes plumb, square, and true to dimensions required. Use cutting methods least likely to damage construction to remain or adjoining construction. Use hand tools or small power tools designed for sawing or grinding, not hammering and chopping, to minimize disturbance of adjacent surfaces. Temporarily cover openings to remain.
 3. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.
 4. Do not use cutting torches until work area is cleared of flammable materials. At concealed spaces, such as duct and pipe interiors, verify condition and contents of hidden space before starting flame-cutting operations. Maintain portable fire-suppression devices during flame-cutting operations.
 5. Maintain adequate ventilation when using cutting torches.
 6. Remove decayed, vermin-infested, or otherwise dangerous or unsuitable materials and promptly dispose of off-site.
 7. Remove structural framing members and lower to ground by method suitable to avoid free fall and to prevent ground impact or dust generation.
 8. Locate selective demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
- B. Removed and Salvaged Items:
1. Clean salvaged items.
 2. Store items in a secure area until delivery to Owner.
 3. Transport items to Owner's storage area designated by Owner.
 4. Protect items from damage during transport and storage.
- C. Removed and Reinstalled Items:
1. Clean and repair items to functional condition adequate for intended reuse.
 2. Protect items from damage during transport and storage.

3. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- D. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, then remove concrete between saw cuts.
- B. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, then remove masonry between saw cuts.
- C. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, then break up and remove.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. General: Except for items or materials indicated to be reused, salvaged, reinstalled, or otherwise indicated to remain Owner's property, remove demolished materials from Project site.
 1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.
- C. Disposal: Transport demolished materials off Owner's property and legally dispose of them.

3.7 CLEANING

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

END OF SECTION 024119

SECTION 040120 - MAINTENANCE OF UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section includes maintenance of unit masonry consisting of clay masonry restoration and cleaning as follows:

1. Repairing unit masonry, including replacing units.
2. Painting steel uncovered during the work.
3. Reanchoring veneers.
4. Pointing cracked joints.
5. Crack stitching cracks
6. Preliminary cleaning, including removing biological staining
7. Cleaning interior and exterior exposed unit masonry surfaces.

- B. Owner-Furnished Material: Salvaged brick for chimney (above roof).

- C. Related Sections:

1. Section 076200 "Sheet Metal Flashing and Trim" for metal flashing installed in or on restored clay masonry.

1.3 ACTION SUBMITTALS

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

- B. Samples for Initial Selection: For the following:

1. Mortar: Submit sets of mortar samples in the form of mortar strips. Submit with precise measurements on ingredients, proportions, sand gradations, and sources of colored sands from which each Sample was made.
2. Sealant Materials: See Section 079200 "Joint Sealants."

- C. Samples for Verification: For the following:

1. Masonry unit to be used for replacing existing units on chimney.
2. Mortar in the form of a preblended 80-lb bag to be used in a mockup. Include with each Sample a list of ingredients with proportions of each.
3. Accessories: Each type of anchor, accessory, and miscellaneous support.

1.4 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
 - 1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Material Certificates: For each type and size of the following:
 - 1. Masonry units. Include data on material properties and material test reports substantiating compliance with requirements.
 - 2. Preblended mortar, including proportions of ingredients.

1.5 QUALITY ASSURANCE

- A. Restoration Specialist Qualifications: Engage an experienced masonry restoration and cleaning firm to perform work of this Section. Experience installing standard unit masonry is not sufficient experience for masonry restoration work.
- B. Source Limitations: Obtain each type of material for masonry restoration (face brick, cement, sand, etc.) from one source with resources to provide materials of consistent quality in appearance and physical properties.
- C. Restoration Program: Prepare a written, detailed description of materials, methods, equipment, and sequence of operations to be used for each phase of restoration work including protection of surrounding materials and Project site.
 - 1. Include methods for keeping pointing mortar damp during curing period.
 - 2. If materials and methods other than those indicated are proposed for any phase of restoration work, add to the Quality-Control Program a written description of such materials and methods, including evidence of successful use on comparable projects, and demonstrations to show their effectiveness for this Project and worker's ability to use such materials and methods properly.
- D. Cleaning and Repair Appearance Standard: Cleaned and repaired surfaces are to have a uniform appearance as viewed from 20 feet away by Architect.
- E. Mockups: Prepare mockups of restoration and cleaning to demonstrate aesthetic effects and set quality standards for materials and execution and for fabrication and installation.
 - 1. Masonry Repair: Prepare sample areas for each type of masonry material indicated to have repair work performed. If not otherwise indicated, size each mockup not smaller than 2 adjacent whole units or approximately 48 inches in least dimension. Erect sample areas in existing walls unless otherwise indicated,

to demonstrate quality of materials, workmanship, and blending with existing work. Include the following as a minimum:

- a. Salvaged units: Salvage and clean one course of bricks from chimney
 - b. Replacement: Replace 4 spalled units.
 - c. Reanchoring Veneers: Install three masonry repair anchors in mockup wall assembly of each anchor type required.
 - d. Patching: Three small holes **as directed** for each type of masonry material indicated to be patched, so as to leave no evidence of repair.
 - e. Add Expansion Joints: Install a 48-inch-long joint at one location as directed.
2. Pointing: Rake out a cracked joint in one location as directed (about 48" long) and point crack in presence of Architect's representative.
 3. Cleaning: Clean an area as indicated (one interior and one exterior).
 - a. Test cleaners and methods on samples of adjacent materials for possible adverse reactions. Do not use cleaners and methods known to have deleterious effect.
 - b. Allow a waiting period of not less than seven days after completion of sample cleaning to permit a study of sample panels for negative reactions.
 4. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 5. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver masonry units to Project site strapped together in suitable packs or pallets or in heavy-duty cartons.
- B. Deliver other materials to Project site in manufacturer's original and unopened containers, labeled with manufacturer's name and type of products.
- C. Store preblended mortar mixes on elevated platforms, under cover, and in a dry location. Do not use materials that have become damp.

1.7 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit masonry restoration and cleaning work to be performed according to manufacturers' written instructions and specified requirements.

- B. Repair masonry units and repoint mortar joints only when air temperature is between 40 and 90 deg F and is predicted to remain so for at least 7 days after completion of the Work unless otherwise indicated.
- C. Cold-Weather Requirements: Comply with the following procedures for masonry repair and mortar-joint pointing unless otherwise indicated:
 - 1. When air temperature is below 40 deg F, heat water, masonry repair materials, and existing masonry walls to produce temperatures between 40 and 120 deg F.
 - 2. When mean daily air temperature is below 40 deg F, provide enclosure and heat to maintain temperatures above 32 deg F within the enclosure for 7 days after repair and pointing.
- D. Hot-Weather Requirements: Protect masonry repair and mortar-joint pointing when temperature and humidity conditions produce excessive evaporation of water from mortar and repair materials. Provide artificial shade and wind breaks and use cooled materials as required to minimize evaporation. Do not apply mortar to substrates with temperatures of 90 deg F and above unless otherwise indicated.
- E. For manufactured repair materials, perform work within the environmental limits set by each manufacturer.
- F. Clean masonry surfaces only when air temperature is 40 deg F and above and is predicted to remain so for at least 7 days after completion of cleaning.

1.8 COORDINATION

- A. Coordinate masonry restoration and cleaning with public circulation patterns at Project site. Some work is near public circulation patterns. Public circulation patterns cannot be closed off entirely, and in places can be only temporarily redirected around small areas of work.] Plan and execute the Work accordingly.

1.9 SEQUENCING AND SCHEDULING

- A. Order replacement materials at earliest possible date to avoid delaying completion of the Work.
- B. Mortar:
 - 1. Sample existing mortar and sand for gradation determination and color matching.
 - 2. Prepare mockup after approval of initial selection.
 - 3. Order for mortar immediately after approval of mockups. Take delivery of and store at Project site a sufficient quantity to complete Project.
- C. Perform masonry restoration work in the following sequence:
 - 1. Inspect for open mortar joints and repair before cleaning to prevent the intrusion of water and other cleaning materials into the wall.

2. Clean masonry surfaces.
3. Rake out mortar from joints surrounding masonry to be replaced and from joints adjacent to masonry repairs along joints.
4. Repair chimney by salvaging existing units as indicated and installing new masonry units
5. Repair masonry below the roof with salvaged masonry units.
6. Rake out mortar from joints to be pointed.
7. Crack stitch cracks where indicated.
8. Point mortar joints.
9. Patch clay masonry units
10. After repairs and repointing have been completed and cured, perform a final cleaning to remove residues from this work.

PART 2 - PRODUCTS

2.1 MASONRY MATERIALS

A. Replacement Brick:

1. Face Brick: Provide units with colors, color variation within units, surface texture, and physical properties to match existing units in size and shape.
 - a. Provide face brick complying with ASTM C 216, Grade SW.
 - b. For Architect's sample that exhibits a range of colors or color variation within units, provide brick that proportionally matches that range rather than brick that matches an individual color within that range.
 - c. Tolerances as Fabricated: Comply with tolerance requirements in ASTM C 216, Type FBS.

B. Salvaged Brick: Obtain salvaged brick from chimney as shown on Drawings. Clean off residual mortar.

2.2 MORTAR MATERIALS

A. Portland Cement: ASTM C 150, Type I or Type II, white or gray or both where required for color matching of exposed mortar.

1. Provide cement containing not more than 0.60 percent total alkali when tested according to ASTM C 114.

B. Hydrated Lime: ASTM C 207, Type S.

C. Mortar Sand: ASTM C 144 unless otherwise indicated.

1. Color: Provide natural sand from the KAW RIVER of color necessary to produce required mortar color.
2. For pointing mortar, provide sand with rounded edges.

3. Match size, texture, and gradation of existing mortar sand as closely as possible. Blend several sands if necessary to achieve suitable match.

D. Mortar Pigments: Natural and synthetic iron oxides, compounded for mortar mixes. Use only pigments with a record of satisfactory performance in masonry mortars.

E. Water: Potable.

2.3 MANUFACTURED REPAIR MATERIALS

A. Masonry Patching Compound: Factory-mixed cementitious product that is custom manufactured for patching masonry.

1. Basis-of-Design Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Cathedral Stone Products, Inc.; Jahn M100 Terra Cotta and Brick Repair Mortar.

b. US Heritage Group; TB15 Heritage Terracotta Brick Repair Mortar.

2. Use formulation that is vapor- and water permeable (equal to or more than the masonry unit), exhibits low shrinkage, has lower modulus of elasticity than the masonry units being repaired, and develops high bond strength to all types of masonry.

3. Use formulation having working qualities and retardation control to permit forming and sculpturing where necessary.

4. Formulate patching compound used for patching brick in colors and textures to match each masonry unit being patched.

2.4 CLEANING MATERIALS

A. Water: Potable.

B. Hot Water: Water heated to a temperature of 140 to 160 deg F.

C. Job-Mixed Detergent Solution: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium polyphosphate, 1/2 cup (125 mL) of laundry detergent, and 20 quarts (20 L) of hot water for every 5 gal. (20 L) of solution required.

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

1. Basis-of-Design Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. EaCo Chem, Inc.; NMD 80 for cleaning mortar stains.
 - b. ProSoCo, Inc.; Vana Trol for cleaning mortar stains.
- E. Biological Stain Remover: Non-toxic, non-acidic clear liquid antimicrobial agent used to remove a broad spectrum of biological stains.
- 1. Basis-of-Design Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. D/2 Biological Solutions, Inc.; D/2 Biological Solution.
 - b. ProSoCo, Inc.; Enviro Klean ReVive.

2.5 ACCESSORY MATERIALS

- A. **Buy America:** Products in this section are subject to Buy America coverage.
- B. Miscellaneous Products: Select materials and methods of use based on the following, subject to approval of a mockup:
- 1. Previous effectiveness in performing the work involved.
 - 2. Little possibility of damaging exposed surfaces.
 - 3. Consistency of each application.
 - 4. Uniformity of the resulting overall appearance.
 - 5. Do not use products or tools that could do the following:
 - a. Remove, alter, or in any way harm the present condition or future preservation of existing surfaces, including surrounding surfaces not in contract.
 - b. Leave a residue on surfaces.
- C. Masonry Repair Anchors, Spiral Type: Stainless-steel spiral rods designed to anchor to backing. Anchors are flexible in plane of veneer but rigid perpendicular to it. Provide driven-in anchors designed to be installed in drilled holes and relying on screw effect rather than adhesive to secure them to backup and veneer.
- D. Crack Stitching Reinforcement:
- 1. Products:
 - a. Helical stainless steel reinforcing bar for masonry repair.
 - 1) Nominal diameter 1/4 inch (6 mm)
 - 2) Material stainless steel grade 304 or 316
 - 3) Cross-section area 0.012 sq. in.
 - 4) Helical pitch 1 inch - 1.125 inch
 - 5) Tensile Strength: 192 ksi
 - b. Non-shrink cementitious grout

- 1) Non-shrink, non-gassing, thixotropic grout
- 2) Flows easily under pressure to fill voids and rapidly develops compressive strength
- 3) Cures to 6525 PSI
- 4) Ready-to-mix components in two-pack sets

2.6 MORTAR MIXES

A. Preblended, dry mortar mix

1. Furnish dry mortar ingredients in form of a preblended mix.
2. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to project site.

B. Mortar Mix:

1. Comply with ASTM C 270, Proportion Specifications - Type N.
 - a. 1 part Portland cement (94#)
 - b. 1.25 parts sand (50#)
 - c. 6.75 cubic feet of sand (540# dry)
 - d. Pigment.
2. Refer to Part 3 for mixing requirements.

C. Colored Mortar: Produce mortar of color required by using specified ingredients. Do not alter specified proportions without Architect's approval.

D. Do not use admixtures in mortar unless otherwise indicated.

PART 3 - EXECUTION

3.1 PROTECTION

A. Protect persons, motor vehicles, surrounding surfaces of building being restored, building site, plants, and surrounding buildings from harm resulting from masonry restoration work.

1. Erect temporary protective covers over walkways and at points of pedestrian and vehicular entrance and exit that must remain in service during course of restoration and cleaning work.

B. Comply with chemical-cleaner manufacturer's written instructions for protecting building and other surfaces against damage from exposure to its products. Prevent chemical-cleaning solutions from coming into contact with people, motor vehicles, landscaping, buildings, and other surfaces that could be harmed by such contact.

1. Cover adjacent surfaces with materials that are proven to resist chemical cleaners used unless chemical cleaners being used will not damage adjacent surfaces. Use materials that contain only waterproof, UV-resistant adhesives. Apply masking agents to comply with manufacturer's written instructions. Do not apply liquid masking agent to painted or porous surfaces. When no longer needed, promptly remove masking to prevent adhesive staining.
2. Keep wall wet below area being cleaned to prevent streaking from runoff.
3. Do not clean masonry during winds of sufficient force to spread cleaning solutions to unprotected surfaces.
4. Neutralize and collect alkaline and acid wastes for disposal off Owner's property.
5. Dispose of runoff from cleaning operations by legal means and in a manner that prevents soil erosion, undermining of paving and foundations, damage to landscaping, and water penetration into building interiors.

C. Prevent mortar from staining face of surrounding masonry and other surfaces.

1. Cover sills, ledges, and projections to protect from mortar droppings.
2. Keep wall area wet below rebuilding and pointing work to discourage mortar from adhering.
3. Immediately remove mortar in contact with exposed masonry and other surfaces.
4. Clean mortar splatters from scaffolding at end of each day.

3.2 BRICK REMOVAL AND REPLACEMENT

A. At locations indicated, remove bricks that are damaged, spalled, or deteriorated or are to be reused. Carefully demolish or remove entire units from joint to joint, without damaging surrounding masonry, in a manner that permits replacement with full-size units.

1. When removing single bricks, remove material from center of brick and work toward outside edges.

B. Support and protect remaining masonry that surrounds removal area. Maintain flashing, reinforcement, lintels, and adjoining construction in an undamaged condition.

C. Notify Architect of unforeseen detrimental conditions including voids, cracks, bulges, and loose units in existing masonry backup, rotted wood, rusted metal, and other deteriorated items.

D. Salvage Units:

1. Remove in an undamaged condition as many whole bricks as possible.
2. Remove mortar, loose particles, and soil from brick by cleaning with hand chisels, brushes, and water.
3. Remove sealants by cutting close to brick with utility knife and cleaning with solvents.
4. Store brick for reuse. Store off ground, on skids, and protected from weather.
5. Deliver cleaned brick not required for reuse to Owner unless otherwise indicated.

- E. Preparation: Clean bricks surrounding removal areas by removing mortar, dust, and loose particles in preparation for replacement.
- F. Replace removed damaged brick with other removed brick (salvaged brick) in good quality, where possible, or with new brick matching existing brick, including size. Do not use broken units unless they can be cut to usable size.
- G. Install replacement brick into bonding and coursing pattern of existing brick. If cutting is required, use a motor-driven saw designed to cut masonry with clean, sharp, unchipped edges.
 - 1. Maintain joint width for replacement units to match existing joints.
 - 2. Use setting buttons or shims to set units accurately spaced with uniform joints.
- H. Lay replacement brick with completely filled bed, head, and collar joints. Butter ends with sufficient mortar to fill head joints and shove into place. Wet both replacement and surrounding bricks that have ASTM C 67 initial rates of absorption (suction) of more than 30 g/30 sq. in. per min. Use wetting methods that ensure that units are nearly saturated but surface is dry when laid.
 - 1. Tool exposed mortar joints in repaired areas to match joints of surrounding existing brickwork.
 - 2. When mortar is sufficiently hard to support units, remove shims and other devices interfering with pointing of joints.

3.3 EXPANSION JOINTS

- A. General: Install expansion joints by sawing into the existing exterior wythe of exterior wall were shown.
- B. Verify through examination that joints can be installed where shown.
- C. Provide joints at are a minimum of 1/4" wide full depth of exterior wythe and 1 /2" wide for eh outer one inch of the joint for sealant and backer rod.

3.4 CRACK STITCHING

- 1. Comply with manufacturer's installation instruction for crack stitching system
- 2. Extend helical reinforcing a minimum of 24" each side of vertical crack.

3.5 PAINTING STEEL UNCOVERED DURING THE WORK

- A. Inspect base of steel building columns (canopy columns are being replaced due to rusted bases) or beams exposed during masonry removal. Where Architect determines member cannot be totally removed, prepare and paint it as follows:
 - 1. Remove paint, rust, and other contaminants, as applicable to meet paint manufacturer's recommended preparation.

2. Immediately paint exposed steel with two coats of antirust coating, following coating manufacturer's written instructions and without exceeding manufacturer's recommended rate of application (dry film thickness per coat).
3. If on inspection and rust removal, the cross section of a steel member is found to be reduced from rust by more than 1/16 inch, notify Architect before proceeding.

3.7 REANCHORING VENEERS

- A. Install masonry repair anchors in horizontal mortar joints and according to manufacturer's written instructions where masonry bond is not sufficient to hold units in place adequately. Install at not more than 16 inches o.c. vertically and 16 inches horizontally o.c., unless otherwise indicated. Install at locations to avoid penetrating flashing.
- B. Recess anchors from surface of mortar joint and fill recess with pointing mortar.

3.8 MASONRY UNIT PATCHING

- A. Patch the following masonry units unless another type of replacement or repair is indicated:
 1. Units indicated to be patched.
- B. Patching Bricks:
 1. Remove loose material from masonry surface. Carefully remove additional material so patch will not have feathered edges but will have square or slightly undercut edges on area to be patched and will be at least 1/4 inch thick, but not less than recommended by patching compound manufacturer.
 2. Mask adjacent mortar joint or rake out for repointing if patch will extend to edge of masonry unit.
 3. Rinse surface to be patched and leave damp, but without standing water.
 4. Brush-coat surfaces with slurry coat of patching compound according to manufacturer's written instructions.
 5. Place patching compound in layers as recommended by patching compound manufacturer
 6. Trowel, scrape, or carve surface of patch to match texture and surrounding surface plane or contour of the masonry unit. Shape and finish surface before or after curing, as determined by testing, to best match existing masonry unit.
 7. Keep each layer damp for 72 hours or until patching compound has set.

3.9 CLEANING MASONRY

- A. Proceed with cleaning in an orderly manner and from one end of each elevation to the other. Ensure that dirty residues and rinse water will not wash over cleaned, dry surfaces.
- B. Use only those cleaning methods indicated for each masonry material and location.

1. Do not use wire brushes or brushes that are not resistant to chemical cleaner being used. Do not use plastic-bristle brushes if natural-fiber brushes will resist chemical cleaner being used.
 2. Use spray equipment that provides controlled application at volume and pressure indicated, measured at spray tip. Adjust pressure and volume to ensure that cleaning methods do not damage masonry. Equip units with pressure gages.
 3. For chemical-cleaner spray application, use low-pressure tank or chemical pump suitable for chemical cleaner indicated, equipped with cone-shaped spray tip.
 4. For water-spray application, use fan-shaped spray tip that disperses water at an angle of 25 to 50 degrees.
 5. For high-pressure water-spray application, use fan-shaped spray tip that disperses water at an angle of at least 40 degrees.
 6. For heated water-spray application, use equipment capable of maintaining temperature between 140 and 160 deg F.
- C. Perform each cleaning method indicated in a manner that results in uniform coverage of all surfaces, including corners, moldings, and interstices, and that produces an even effect without streaking or damaging masonry surfaces.
- D. Chemical-Cleaner Application Methods: Apply chemical cleaners to masonry surfaces to comply with chemical-cleaner manufacturer's written instructions; use brush or spray] application. Do not spray apply at pressures exceeding 50 psi. Do not allow chemicals to remain on surface for periods longer than those indicated or recommended by manufacturer.
- 3.10 AFTER CLEANING
- A. After cleaning is complete, remove protection no longer required. Remove tape and adhesive marks.
- B. Interior Cleaning:
1. Clean all soiled surfaces throughout the interior of building with job-mixed detergent solution.
 2. Protect non-masonry surfaces from damage from moisture and detergent cleaning solutions.
- C. Biological Stain Removal:
1. Before starting review of existing conditions remove biological staining.
 2. Apply biological stain remover to dry surface by brush or low-pressure spray per manufacturer's recommendation. Scrub masonry with medium-soft brushes until mold, mildew, and algae are thoroughly dislodged and can be removed by rinsing. Use small brushes for mortar joints and crevices. Dip brush in mold, mildew, and algae remover often to ensure that adequate fresh cleaner is used and that masonry surface remains wet. Rinse with cold water applied by medium-pressure spray to remove mold, mildew, and algae remover and soil. Repeat cleaning procedure above where required to produce cleaning effect established by mockup.

D. Chemical Cleaning:

1. Wet masonry with cold water applied by low-pressure spray.
2. Apply cleaner to masonry according to manufacturer's instructions. Let cleaner remain on surface for period indicated below:
 - a. As recommended by chemical-cleaner manufacturer.
 - b. As established by mockup.
 - c. Two to three minutes.
3. Rinse with cold water applied by medium-pressure spray to remove chemicals and soil.
4. Repeat cleaning procedure above where required to the produce cleaning effect established by cleaning mockup or preliminary testing. Do not repeat more than once.

3.11 POINTING MASONRY

A. Rake out and point joints to the following extent:

1. All joints in areas indicated.
2. Joints where mortar is missing or where they contain holes.
3. Cracked joints where cracks can be penetrated at least 1/4 inch by a knife blade 0.027 inch thick.
4. Cracked joints where cracks are 1/16 inch or more in width and of any depth.
5. Joints where they have been filled with substances other than mortar.
6. Joints indicated as sealant-filled joints (sill stone band had joints)

B. Do not rake out and repoint joints where not required.

C. Rake out joints as follows, according to procedures demonstrated in approved mockup:

1. Uncracked joints: remove mortar from joints to depth of 2 times joint width or not less than that required to expose sound, unweathered mortar.
2. Cracked joints: remove mortar from joints to depth of 3 times joint width, but not more than 1.125" or not less than that required to expose sound, unweathered mortar.
3. Remove mortar from masonry surfaces within raked-out joints to provide reveals with square backs and to expose masonry for contact with pointing mortar. Brush, vacuum, or flush joints to remove dirt and loose debris.
4. Do not spall edges of masonry units or widen joints. Replace or patch damaged masonry units as directed by Architect.
 - a. Cut out mortar by hand with chisel and resilient mallet. Do not use power-operated grinders without Architect's written approval based on approved quality-control program.
 - b. Cut out center of mortar bed joints using angle grinders with diamond-impregnated metal blades. Remove remaining mortar by hand with chisel and resilient mallet. Strictly adhere to approved quality-control program.

- D. Notify Architect of unforeseen detrimental conditions including voids in mortar joints, cracks, loose masonry units, rotted wood, rusted metal, and other deteriorated items.
- E. Mixing Mortar:
 - 1. Mixing Rebuild mortar: Mix materials in a clean mechanical mixer.
 - 2. Mixing Pointing Mortar: Add only enough water to produce a damp, unworkable mix that will retain its form when pressed into a ball. Maintain mortar in this dampened condition for 15 to 30 minutes. Add remaining water in small portions until mortar reaches desired consistency. Use mortar within one hour of final mixing; do not retemper or use partially hardened material
- F. Preparation:
 - 1. Rinse joint surfaces with water to remove all dust and mortar particles. Time rinsing application so joint surfaces are damp but free of standing water at time of pointing. If rinse water dries, dampen joint surfaces before pointing.
- G. Pointing
 - 1. Apply pointing mortar first to areas where existing mortar was removed to depths greater than surrounding areas. Apply in layers not greater than 3/8 inch until a uniform depth is formed. Fully compact each layer thoroughly and allow it to become thumbprint hard before applying next layer.
 - 2. After low areas have been filled to same depth as remaining joints, point all joints by placing mortar in layers not greater than 3/8 inch. Fully compact each layer and allow to become almost thumbprint hard before applying next layer. Where existing masonry units have worn or rounded edges, slightly recess finished mortar surface below face of masonry to avoid widened joint faces. Take care not to spread mortar beyond joint edges onto exposed masonry surfaces or to featheredge the mortar.
 - 3. When mortar is thumbprint hard, tool joints to match original appearance of joints as demonstrated in approved mockup. Remove excess mortar from edge of joint by brushing.
- H. Curing: Cure mortar by maintaining in thoroughly damp condition for at least 72 consecutive hours including weekends and holidays.
 - 1. Acceptable curing methods include covering with wet burlap and plastic sheeting, periodic hand misting, and periodic mist spraying using system of pipes, mist heads, and timers.
 - 2. Adjust curing methods to ensure that pointing mortar is damp throughout its depth without eroding surface mortar.
- I. Repairs: Hairline cracking within the mortar or mortar separation at edge of a joint is unacceptable. Completely remove such mortar and repoint.
- J. Where repointing work precedes cleaning of existing masonry, allow mortar to harden at least 30 days before beginning cleaning work.

3.12 FINAL CLEANING

- A. After mortar has fully hardened, thoroughly clean exposed masonry surfaces of excess mortar and foreign matter; use wood scrapers, stiff-nylon or -fiber brushes, and clean water, spray applied at low pressure.
 - 1. Do not use metal scrapers or brushes.
 - 2. Do not use acidic or alkaline cleaners.
- B. Wash adjacent woodwork and other non-masonry surfaces. Use detergent and soft brushes or cloths.
- C. Clean mortar and debris from roof; remove debris from gutters and downspouts. Rinse off roof and flush gutters and downspouts.
- D. Sweep and rake adjacent pavement and grounds to remove mortar and debris. Where necessary, pressure wash pavement surfaces to remove mortar, dust, dirt, and stains.

3.13 FIELD QUALITY CONTROL

- A. Architect's Project Representatives: Architect will assign Project representatives to help carry out Architect's responsibilities at the site, including observing progress and quality of portion of the Work completed. Allow Architect's Project representatives use of lift devices and scaffolding, as needed, to observe progress and quality of portion of the Work completed.
- B. Notify Architect's Project representatives in advance of times when lift devices and scaffolding will be relocated. Do not relocate lift devices and scaffolding until Architect's Project representatives have had reasonable opportunity to make observations of work areas at lift device or scaffold location.

END OF SECTION 040120

SECTION 042000 - UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:
 - 1. Structural-clay facing tile.
 - 2. Mortar and grout.
 - 3. Steel reinforcing bars.
 - 4. Masonry joint reinforcement.
 - 5. Ties and anchors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection:
 - 1. Glazed structural-clay tile.
 - 2. Colored mortar.

1.4 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers, source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.
 - 1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.
- B. Material Certificates: For each type and size of the following:
 - 1. Masonry units.

- a. Include data on material properties and material test reports substantiating compliance with requirements.
 - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
2. Joint reinforcement.
 3. Anchors, ties, and metal accessories.
- C. Mix Designs: For each type of mortar. Include description of type and proportions of ingredients.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Where masonry is to match existing, erect panels adjacent and parallel to existing surface.
 2. Approval of mock-up panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
- a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless such deviations are specifically approved by Architect in writing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- C. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.7 PROJECT CONDITIONS

- A. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
 - 1. Protect sills, ledges, and projections from mortar droppings.
 - 2. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.

PART 2 - PRODUCTS

2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.

2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
 - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
 - 2. Provide square-edged and bullnose units for outside corners unless otherwise indicated.
- B. CMUs: ASTM C 90.
 - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi.
 - 2. Density Classification: Lightweight, unless otherwise indicated, match existing.
 - 3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.

2.3 Exposed Faces: Provide color and texture matching the existing.

2.4 STRUCTURAL-CLAY FACING TILE

- A. General:
 - 1. Use salvaged units or provide new matching units with direction of cores to match existing.

2. Where reinforced masonry is indicated, provide units designed for use in reinforced, grouted masonry; either with vertical cores and with webs notched to receive horizontal reinforcement, or with horizontal cores and with holes in bed shells for placement of grout and to receive vertical reinforcement.
3. Provide special shapes where required for corners, jambs, coved bases, sills, and other special conditions indicated to match existing assembly.
4. Where direct application of plaster is indicated or where bonded to backup masonry, provide units with rough, combed, or scored faces if available.

B. Glazed Structural-Clay Facing Tile: ASTM C 126.

1. 6T Series, subject to compliance with requirements.
2. Provide Type I (single-faced units) where only one finished face is exposed when units are installed, and Type II (double-faced units) where two opposite finished faces are exposed when units are installed.
3. Provide special units glazed on ends and tops, as well as faces for corners, jambs, sills, pilasters, columns, and other applications indicated, where glazed units are exposed on other surfaces and faces.
4. Colors and Patterns: Selected from manufacturer's full range of colors and patterns.

2.5 MORTAR AND GROUT MATERIALS

A. Aggregate for Mortar: ASTM C 144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color that matches existing mortar.

B. Aggregate for Grout: ASTM C 404.

C. Epoxy Pointing Mortar: ASTM C 395, epoxy-resin-based material formulated for use as pointing mortar for structural-clay tile facing units (and approved for such use by manufacturer of units); in color indicated or, if not otherwise indicated, as selected by Architect from manufacturer's colors.

D. Water: Potable.

2.6 REINFORCEMENT

A. **Buy America:** Products in this section are subject to Buy America coverage.

B. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60

C. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.

1. Interior Walls: Hot-dip galvanized, carbon steel.

- D. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

2.7 TIES AND ANCHORS

- A. **Buy America:** Products in this section are subject to Buy America coverage.
- B. **Materials:** Provide ties and anchors specified in this article that are made from materials that comply with manufacturers' recommendations and match existing assembly.
- C. **Wire Ties, General:** Unless otherwise indicated, size wire ties to extend at least halfway through veneer but with at least 5/8-inch (16-mm) cover on outside face. Outer ends of wires are bent 90 degrees and extend 2 inches (50 mm) parallel to face of veneer.

2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. **Buy America:** Products in this section are subject to Buy America coverage.
- B. **Reinforcing Bar Positioners:** Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
 - 1. Products: Subject to compliance with requirements:

2.9 MASONRY CLEANERS

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

2.10 MORTAR AND GROUT MIXES

- A. **General:** Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
- B. **Preblended, Dry Mortar Mix:** Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
 - 1. Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated:
 - a. For concrete masonry, use Type N.
 - b. For glazed structural-clay tile, use Type S.

- C. Pigmented Mortar: Use colored cement product or select and proportion pigments with other ingredients to produce color required. Do not add pigments to colored cement products.
 - 1. Mix to match existing mortar
 - 2. Application: Use pigmented mortar for exposed mortar joints with the following units:
 - a. Glazed structural-clay facing tile.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- D. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures.
 - 1. Mix units from several pallets or cubes as they are placed.
- E. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

3.3 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns,

and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.

- B. Bond Pattern for Exposed Masonry: To match existing.
- C. Lay hollow CMUs as follows: With face shells fully bedded in mortar and with head joints of depth equal to bed joints
- D. Lay structural-clay tile as follows:
 - 1. Lay horizontal-cell units with full bed joints unless otherwise indicated. Form head joints with sufficient mortar so excess will be squeezed out as units are placed in position. Butter both sides of units to be placed, or butter one side of unit already in place and one side of unit to be placed.
 - 2. Maintain joint thicknesses indicated except for minor variations required to maintain bond alignment.
- E. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- F. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- G. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
 - 1. Fasten partition top anchors to structure above and build into top of partition.

3.4 MORTAR BEDDING AND JOINTING

- A. Lay structural-clay tile as follows:
 - 1. Maintain joint thicknesses (to match existing) indicated except for minor variations required to maintain bond alignment.
- B. Tool exposed joints slightly concave to match existing.
 - 1. For glazed masonry units, use a nonmetallic jointer 3/4 inch (19 mm) or more in width.

3.5 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
 - 1. Space reinforcement not more than 16 inches (406 mm) o.c.

2. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings.
 - B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
 - C. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.
- 3.6 CONTROL AND EXPANSION JOINTS
- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- 3.7 LINTELS
- A. Install steel lintels where indicated.
 - B. Provide minimum bearing of 8 inches at each jamb unless otherwise indicated.
- 3.8 REPAIRING, POINTING, AND CLEANING
- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
 - B. Pointing: During the tooling of joints, enlarge voids and holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
 - C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
 - D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
 1. Clean masonry units as recommended by masonry manufacturer.
 2. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
 3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
 - E. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 042000

SECTION 051213 - ARCHITECTURALLY EXPOSED STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section includes architecturally exposed structural-steel framing, exterior steel pipe columns.
- B. **Buy America:** Products in this section are subject to Buy America coverage.

1.3 DEFINITIONS

- A. Architecturally Exposed Structural Steel: Structural steel designated as "architecturally exposed structural steel" or "AESS" in the Contract Documents.
- B. Category 1 AESS: AESS that is within 96 inches (2400 mm) vertically and 36 inches (900 mm) horizontally of a walking surface and is visible to a person standing on that walking surface or is designated as "Category 1 architecturally exposed structural steel" or "AESS-1" in the Contract Documents.
- C. Category 2 AESS: AESS that is within 20 feet (6 m) vertically and horizontally of a walking surface and is visible to a person standing on that walking surface or is designated as "Category 2 architecturally exposed structural steel" or "AESS-2" in the Contract Documents.
- D. Category 3 AESS: AESS that is not defined as Category 1 or Category 2 or that is designated as "Category 3 architecturally exposed structural steel" or "AESS-3" in the Contract Documents.

1.4 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication of AESS components. Shop Drawings for structural steel may be used for AESS provided items of AESS are specifically identified and requirements below are met for AESS.
 - 1. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain. Indicate grinding, finish, and profile of welds.

2. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections. Indicate orientation of bolt heads.
3. Indicate exposed surfaces and edges and surface preparation being used.
4. Indicate special tolerances and erection requirements.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category [ACSE] [CSE].
- B. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.
- C. Mockups: Build mockups of AESS to set quality standards for fabrication and installation.
 1. Build mockup of typical portion of AESS as shown on Drawings.
 2. Coordinate finish painting requirements with Section 099113 "Exterior Painting"
 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- D. Preinstallation Conference: Conduct conference at Project site.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Use special care in handling to prevent twisting, warping, nicking, and other damage. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.

1.8 PROJECT CONDITIONS

- A. Field Measurements: Where AESS is indicated to fit against other construction, verify actual dimensions by field measurements before fabrication.

1.9 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.

PART 2 - PRODUCTS

2.1 STRUCTURAL STEEL MATERIALS

- A. **Buy America:** Products in this section are subject to Buy America coverage.
- B. Plate and Bar: ASTM A 36/A 36M.
- C. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
 - 1. Weight Class: Standard.
 - 2. Finish: Galvanized.
- D. Welding Electrodes: Comply with AWS requirements.

2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. **Buy America:** Products in this section are subject to Buy America coverage.
- B. Corrosion-Resisting (Weathering Steel), Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 3, round-head assemblies, consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.

2.3 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
 - 1. Do not quench or apply post-galvanizing treatments that might interfere with paint adhesion.
 - 2. Fill vent and drain holes that are exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
 - 3. Galvanize all structural-steel.

2.4 FABRICATION

- A. Shop fabricate and assemble AESS to the maximum extent possible. Locate field joints at concealed locations if possible. Detail assemblies to minimize handling and to expedite erection.

- B. In addition to special care used to handle and fabricate AESS, comply with the following:
 - 1. Fabricate with exposed surfaces smooth, square, and free of surface blemishes including pitting, rust, scale, and roughness.
 - 2. Grind sheared, punched, and flame-cut edges of AESS to remove burrs and provide smooth surfaces and edges.
 - 3. Fabricate AESS with exposed surfaces free of mill marks, including rolled trade names and stamped or raised identification.
 - 4. Fabricate AESS with exposed surfaces free of seams to maximum extent possible.
 - 5. Remove blemishes by filling or grinding or by welding and grinding, before cleaning, treating, and shop priming.
 - 6. Fabricate with piece marks fully hidden in the completed structure.
 - 7. Fabricate AESS to the tolerances specified in AISC 303 for steel that is designated AESS.
- C. Coping, Blocking, and Joint Gaps: Maintain uniform gaps of 1/8 inch (3.2 mm) with a tolerance of 1/32 inch (0.8 mm) for AESS.
- D. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.

2.5 SHOP CONNECTIONS

- A. Weld Connections: Comply with AWS D1.1/D1.1M and AWS D1.8/D1.8M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work, and comply with the following:
 - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding specified tolerances.
 - 2. Use weld sizes, fabrication sequence, and equipment for AESS that limit distortions to allowable tolerances.
 - 3. Grind butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch (plus 1.5 mm, minus 0 mm) for AESS.
 - 4. Make butt and groove welds flush to adjacent surfaces within tolerance of plus 1/16 inch, minus 0 inch (plus 1.5 mm, minus 0 mm) for AESS. Do not grind unless required for clearances or for fitting other components, or unless directed to correct unacceptable work.
 - 5. Make fillet welds for AESS oversize and grind to uniform profile with smooth face and transition.

2.6 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
 - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
 - 2. Surfaces to be field welded.
 - 3. Surfaces to be high-strength bolted with slip-critical connections.
 - 4. Galvanized surfaces.

- B. Surface Preparation for Nongalvanized Steel: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
- C. Preparing Galvanized Steel for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify, with steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
- B. Examine AESS for twists, kinks, warping, gouges, and other imperfections before erecting.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep AESS secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

3.3 ERECTION

- A. Set AESS accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.

3.4 FIELD CONNECTIONS

- A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
- B. Weld Connections: Comply with requirements in "Weld Connections" Paragraph in "Shop Connections" Article.

3.5 FIELD QUALITY CONTROL

- A. Structural Engineer will observe AESS in place to determine acceptability relating to structural integrity.
- B. Architect will observe AESS in place to determine acceptability relating to aesthetic effect.

3.6 REPAIRS AND PROTECTION

- A. Remove welded tabs that were used for attaching temporary bracing and safety cabling and that are exposed to view in the completed Work. Grind steel smooth.

END OF SECTION 051213

SECTION 057500 - DECORATIVE FORMED METAL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:
 - 1. Fascia Wrap, custom-formed to match existing

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Decorative formed metal items, including anchors and connections, shall withstand the effects of gravity loads and the all loads and stresses without exceeding the allowable design working stress of materials involved and without exhibiting permanent deformation in any components.
- B. Control of Corrosion: Prevent galvanic action and other forms of corrosion by insulating metals and other materials from direct contact with incompatible materials.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include finishing materials.
- B. Shop Drawings: Show fabrication and installation details for decorative formed metal.
 - 1. Include plans, elevations, component details, and attachments to other work.
 - 2. Indicate materials and profiles of the decorative formed metal member, fittings, joinery, finishes, fasteners, anchorages, and accessory items.
- C. Samples for Verification: For each type of exposed finish required, prepared a linear 6-inch- (150-mm-) sample of metal of same thickness and material indicated for the Work.

1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing decorative formed metal similar to that indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Organic-Coating Applicator Qualifications: A firm experienced in successfully applying organic coatings of type indicated to metals of types indicated and that employs

competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.

- C. Anodic Finisher Qualifications: A firm experienced in successfully applying anodic finishes of type indicated and that employs competent control personnel to conduct continuing, effective quality-control program to ensure compliance with requirements.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
 - 1. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
- E. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
 - 1. Build mockups for the decorative formed metal.
 - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- F. Preinstallation Conference: Conduct conference at Project site.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver decorative formed metal products wrapped in protective coverings and strapped together in suitable packs or in heavy-duty cartons. Remove protective coverings before they bond to finished surfaces.
- B. Store products on elevated platforms in a dry location.

1.7 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls, columns, beams, and other construction contiguous with decorative formed metal by field measurements before fabrication and indicate measurements on Shop Drawings.

1.8 COORDINATION

- A. Coordinate installation of decorative formed metal with adjacent construction to ensure that wall assemblies, flashings, trim, and joint sealants, are protected against damage from the effects of weather, age, corrosion, and other causes.

PART 2 - PRODUCTS

2.1 SHEET METAL

- A. General: Provide sheet metal without pitting, seam marks, roller marks, stains, discolorations, or other imperfections where exposed to view on finished units.

- B. Aluminum Sheet: Flat sheet complying with ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 3003-H32.

2.2 MISCELLANEOUS MATERIALS

- A. Sealants, Exterior: ASTM C 920; elastomeric silicone; of type, grade, class, and use classifications required to seal joints in decorative formed metal and remain weathertight; and as recommended in writing by decorative formed metal manufacturer.
- B. Backing Materials: Provided or recommended by decorative formed metal manufacturer.
- C. Isolation Coating: Manufacturer's standard bituminous paint.

2.3 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble decorative formed metal items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Coordinate dimensions and attachment methods of decorative formed metal items with those of adjoining construction to produce integrated assemblies with closely fitting joints and with edges and surfaces aligned unless otherwise indicated.
- C. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide surface flatness equivalent to stretcher-leveled standard of flatness and sufficient strength for indicated use.
 - 1. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
- D. Where welding or brazing is indicated, weld or braze joints and seams continuously. Grind, fill, and dress to produce smooth, flush, exposed surfaces in which joints are not visible after finishing is completed.
 - 1. Use welding and brazing procedures that will blend with and not cause discoloration of metal being joined.

2.4 METAL FASCIA

- A. Manufacturers: Subject to compliance with requirements.
- B. Form metal fascia from metal of type and thickness indicated below:
 - 1. Aluminum Sheet: 22 gauge, 0.025 inch.
 - a. Finish: To match existing.

2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in the same piece are not acceptable.

2.6 ALUMINUM FINISHES

- A. Match existing original aluminum finishes.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of decorative formed metal.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Locate and place decorative formed metal items level and plumb and in alignment with adjacent construction. Perform cutting, and fitting required to install decorative formed metal.
 - 1. Do not cut or abrade finishes that cannot be completely restored in the field. Return items with such finishes to the shop for required alterations, followed by complete refinishing, or provide new units as required.
- B. Form tight joints with connections accurately fitted together. Provide reveals and openings for sealants and joint fillers as indicated.
- C. Install concealed joint fillers, sealants, and flashings, as the Work progresses, to make exterior decorative formed metal items weatherproof.
- D. Corrosion Protection: Apply bituminous paint or other permanent separation materials on concealed surfaces where metals would otherwise be in direct contact with substrate materials that are incompatible or could result in corrosion or deterioration of either material or finish.

3.3 ADJUSTING AND CLEANING

- A. Unless otherwise indicated, clean metals by washing thoroughly with clean water and soap, rinsing with clean water, and drying with soft cloths.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit or provide new units.

3.4 PROTECTION

- A. Protect finishes of decorative formed metal items from damage during construction period. Remove temporary protective coverings at time of Substantial Completion.

END OF SECTION 057500

SECTION 060312 - HISTORIC WOOD REPAIR

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes historic treatment of wood in the form of repairing wood features as follows:
 - 1. Repairing wood paneling, casework, and trim.
 - 2. Repairing, refinishing, and replacing hardware.
- B. Related Requirements:
 - 1. Section 013591 "Historic Treatment Procedures" for general historic treatment requirements.

1.3 SEQUENCING AND SCHEDULING

- A. Perform historic wood repair in the following sequence, which includes work specified in this and other Sections:
 - 1. Before removing wood components for on-site or off-site repair, tag each component with location-identification numbers. Indicate on tags and building plans the locations of each component, such as "Baseboard on North Side of Room 101."
 - 2. Dismantle hardware and tag with location-identification numbers.
 - 3. In the shop, label each repaired component and whole or partial replacement with permanent location-identification number in inconspicuous location and remove site-applied tags.
 - 4. Sort units by condition, separating those that need extensive repair.
 - 5. Clean surfaces.
 - 6. General Wood-Repair Sequence:
 - a. Remove paint to bare wood.
 - b. Repair wood by consolidation, replacement, partial replacement, and patching.
 - c. Sand, prime, fill, sand again, and prime surfaces again for refinishing.
 - 7. Repair, refinish, and replace hardware if required. Reinstall operating hardware.
 - 8. Reinstall components.
 - 9. Apply finish coats.

10. Install remaining hardware.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 1. Include recommendations for product application and use. Include test data substantiating that products comply with requirements.
- B. Samples for Initial Selection: For each type of exposed wood and finish.
 1. Identify wood species, cut, and other features.
 2. Include Samples of hardware and accessories involving color selection.
- C. Samples for Verification: For the following products in manufacturer's standard sizes unless otherwise indicated, finished as required for use in the Work:
 1. Replacement Wood: **12-inch-** (300-mm-) long, full-size molding sections with applied finish.
 - a. Additional Samples of replacement members that show fabrication techniques, materials, and finishes as requested by Architect.
 2. Repaired Wood: Prepare Samples using existing wood removed from site, repaired, and prepared for refinishing.
 3. Refinished Wood: Prepare Samples using existing wood removed from site, repaired, and refinished.
 4. Hardware: Full-size units with each factory-applied or restored finish.

1.5 QUALITY ASSURANCE

- A. Mockups: Prepare mockups of historic treatment repair processes to demonstrate aesthetic effects and to set quality standards for materials and execution, and for fabrication and installation. Prepare mockups so they are as inconspicuous as practicable.
 1. Locate mockups in locations that enable viewing under same conditions as the completed Work.
 2. Wood Repair: Prepare an approximately **72-inch (2000-mm)** length of trim to serve as mockup to demonstrate samples of each type of wood repair.
 3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Pack, deliver, and store products in suitable packs, heavy-duty cartons, or wooden crates; surround with sufficient packing material to ensure that products will not be deformed, broken, or otherwise damaged.

- B. Until installed, store products inside a well-ventilated area and protect from weather, moisture, soiling, abrasion, extreme temperatures, and humidity, and where environmental conditions comply with manufacturer's requirements.

1.7 FIELD CONDITIONS

- A. Weather Limitations: Proceed with historic wood repair only when existing and forecasted weather conditions are within the environmental limits set by each manufacturer's written instructions and specified requirements.

PART 2 - PRODUCTS

2.1 HISTORIC WOOD REPAIR, GENERAL

- A. Quality Standard: Comply with applicable requirements in Section 12, "Historic Restoration Work," and related requirements in AWI/AWMAC/WI's "Architectural Woodwork Standards" for construction, finishes, grade rules, and other requirements unless otherwise indicated.
 - 1. Exception: Industry practices cited in Section 12, Article 1.5, "Industry Practices," of the Architectural Woodwork Standards do not apply to the work of this Section.

2.2 REPLICATED WOOD ITEMS

- A. Replicated Wood Paneling, Trim, and Casework: Custom-fabricated replacement wood units and components, with operating and latching hardware.
 - 1. Joint Construction: Joints matching existing joints.
 - 2. Wood Species: Match species of existing wood.
 - 3. Wood Cut: Match cut of existing wood.
 - 4. Wood Member and Trim Profiles: Match profiles and detail of existing.
 - 5. Hardware: Reuse existing unless otherwise indicated.

2.3 WOOD-REPLACEMENT MATERIALS

- A. Wood, General: Clear fine-grained lumber; kiln dried to a moisture content of 6 to 12 percent at time of fabrication; free of visible finger joints, blue stain, knots, pitch pockets, and surface checks larger than **1/32 inch (0.8 mm)** deep by **2 inches (51 mm)** wide.
 - 1. Species: Match species of each existing type of wood component or assembly unless otherwise indicated.
- B. Paneling: Match existing species.
- C. Interior Trim: Match existing species.

- D. Casework: Match existing species.

2.4 WOOD-REPAIR MATERIALS

- A. Source Limitations: Obtain wood consolidant and wood-patching compound from single source from single manufacturer.
- B. Wood Consolidant: Ready-to-use product designed to penetrate, consolidate, and strengthen soft fibers of wood materials that have deteriorated due to weathering and decay and designed specifically to enhance the bond of wood-patching compound to existing wood.
- C. Wood-Patching Compound: Two-part, epoxy-resin, wood-patching compound; knife-grade formulation as recommended in writing by manufacturer for type of wood repair indicated, tooling time required for the detail of work, and site conditions. Compound shall be designed for filling voids in damaged wood materials that have deteriorated due to weathering and decay. Compound shall be capable of filling deep holes and spreading to featheredge.

2.5 HARDWARE

- A. Hardware, General: Provide hardware required for each type of replicated or repaired wood, including but not limited to, hinges, pulls, latches, fasteners, and accessories indicated or required for proper operation. Hardware shall smoothly operate, tightly close, and secure units appropriately for frequency of use, unit weight, and dimensions.
- B. Replacement Hardware: Replace existing damaged or missing hardware with new hardware.
- C. Material and Design:
 - 1. Material: Match type and appearance of existing unless otherwise indicated.
 - 2. Design: Match type and appearance of existing hardware.
 - 3. Replacement Hardware: Regardless of mechanisms within, match existing, exposed hardware of the following types:
 - a. Knobs, levers, and escutcheons.
 - b. Latches.
 - c. Surface-mounted bolts
 - d. Handles.
 - e. Pulls.

2.6 MISCELLANEOUS MATERIALS

- A. Borate Preservative Treatment: Inorganic, borate-based solution, with disodium octaborate tetrahydrate as the primary ingredient; manufactured for preserving weathered and decayed wood from further damage caused by fungi and wood-boring insects; complying with AWPA P5; containing no boric acid.

- B. Cleaning Materials:
1. Detergent Solution: Solution prepared by mixing 2 cups (0.5 L) of tetrasodium pyrophosphate (TSPP), 1/2 cup (125 mL) of laundry detergent that contains no ammonia, 5 quarts (5 L) of 5 percent sodium hypochlorite bleach, and 15 quarts (15 L) of warm water for each 5 gal. (20 L) of solution required.
 2. Mildewcide: Commercial, proprietary mildewcide or a solution prepared by mixing 1/3 cup (80 mL) of household detergent that contains no ammonia, 1 quart (1 L) of 5 percent sodium hypochlorite bleach, and 3 quarts (3 L) of warm water.
- C. Adhesives: Wood adhesives with minimum 15- to 45-minute cure at 70 deg F (21 deg C), in gunnable and liquid formulations as recommended in writing by adhesive manufacturer for each type of repair and exposure condition.
- D. Fasteners: Use fastener metals that are noncorrosive and compatible with each material joined.
1. Match existing fasteners in material and type of fastener unless otherwise indicated.
 2. Use concealed fasteners for interconnecting wood components.
 3. Use concealed fasteners for attaching items to other work unless exposed fasteners are unavoidable or the existing fastening method.
 4. For fastening metals, use fasteners of same basic metal as fastened metal unless otherwise indicated.
 5. For exposed fasteners, use Phillips-type machine screws of head profile flush with metal surface unless otherwise indicated.
 6. Finish exposed fasteners to match finish of metal fastened unless otherwise indicated.

2.7 WOOD FINISHES

- A. Unfinished Replacement Units: Provide exposed interior wood surfaces of replacement units unfinished; smooth, filled, and suitably prepared for on-site priming and finishing.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Protect adjacent materials from damage by historic wood repair.
- B. Clean wood of mildew, algae, moss, plant material, loose paint, grease, dirt, and other debris by scrubbing with bristle brush or sponge and detergent solution. Scrub mildewed areas with mildewcide. After cleaning, rinse thoroughly with fresh water. Allow to dry before repairing or painting.
- C. Condition replacement wood members and replacement units to prevailing conditions at installation areas before installing.

3.2 HISTORIC WOOD REPAIR, GENERAL

- A. Historic Treatment Appearance Standard: Completed work is to have a uniform appearance as viewed by Architect from 5 feet (1.5 m) away for interior work and from 20 feet 6 m away for exterior work.
- B. General: In treating historic items, disturb them as minimally as possible and as follows:
 - 1. Stabilize and repair wood to reestablish structural integrity and weather resistance while maintaining the existing form of each item.
 - 2. Remove coatings and apply borate preservative treatment before repair. Remove coatings according to Section 090391 "Historic Treatment of Plain Painting" unless otherwise indicated.
 - 3. Repair items in place where possible.
 - 4. Install temporary protective measures to protect wood-treatment work that is indicated to be completed later.
 - 5. Refinish historic wood according to Section 090391 "Historic Treatment of Plain Painting" unless otherwise indicated.
- C. Mechanical Abrasion: Where mechanical abrasion is needed for the work, use only the gentlest mechanical methods, such as scraping and natural-fiber bristle brushing, that will not abrade wood substrate, reducing clarity of detail. Do not use abrasive methods, such as sanding, wire brushing, or power tools, except as indicated as part of the historic treatment program and as approved by Architect.
- D. Repair and Refinish Existing Hardware: Dismantle hardware; strip paint, repair, and refinish it to match finish samples; and lubricate moving parts just enough to function smoothly.
- E. Repair Wood: Match existing materials and features, retaining as much original material as possible to perform repairs.
 - 1. Unless otherwise indicated, repair wood by consolidating, patching, splicing, or otherwise reinforcing wood with new wood matching existing wood or with salvaged, sound, original wood.
 - 2. Where indicated, repair wood by limited replacement matching existing material.
- F. Replace Wood: Where indicated, duplicate and replace units with units made from salvaged, sound, original wood or with new wood matching existing wood. Use surviving prototypes to create patterns for duplicate replacements.
 - 1. Do not use substitute materials unless otherwise indicated.
 - 2. Compatible substitute materials may be used.
- G. Identify removed items with numbering system corresponding to item locations, to ensure reinstallation in same location. Key items to Drawings showing location of each removed unit. Permanently label units in a location that will be concealed after reinstallation.

3.3 WOOD PATCH-TYPE REPAIR

- A. General: Patch wood that exhibits depressions, holes, or similar voids, and that has limited amounts of rotted or decayed wood.
 - 1. Verify that surfaces are sufficiently clean and free of paint residue prior to patching.
 - 2. Treat wood with wood consolidant prior to application of patching compound. Coat wood surfaces by brushing, applying multiple coats until wood is saturated and refuses to absorb more. Allow treatment to harden before filling void with patching compound.
 - 3. Remove rotted or decayed wood down to sound wood.
- B. Apply borate preservative treatment to accessible surfaces either before applying wood consolidant or after removing rotted or decayed wood. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom. Allow treatment to dry.
- C. Apply wood-patching compound to fill depressions, nicks, cracks, and other voids created by removed or missing wood.
 - 1. Prime patch area with application of wood consolidant or manufacturer's recommended primer.
 - 2. Mix only as much patching compound as can be applied according to manufacturer's written instructions.
 - 3. Apply patching compound in layers as recommended in writing by manufacturer until the void is completely filled.
 - 4. Sand patch surface smooth and flush with adjacent wood, without voids in patch material, and matching contour of wood member.
 - 5. Clean spilled compound from adjacent materials immediately.

3.4 WOOD-REPLACEMENT REPAIR

- A. General: Replace parts of or entire wood items at locations indicated on Drawings and where damage is too extensive to patch.
 - 1. Remove surface-attached items from wood surface before performing wood-replacement repairs unless otherwise indicated.
 - 2. Verify that surfaces are sufficiently clean and free of paint residue prior to repair.
 - 3. Remove broken, rotted, and decayed wood down to sound wood.
 - 4. Custom fabricate new wood to replace missing wood; either replace entire wood member or splice new wood part into existing member.
 - 5. Secure new wood using finger joints, multiple dowels, or splines with adhesive and nailing to ensure maximum structural integrity at each splice. Use only concealed fasteners. Fill nail holes and patch surface to match surrounding sound wood.
- B. Apply borate preservative treatment to accessible surfaces after replacements are made. Apply treatment liberally by brush to joints, edges, and ends; top, sides, and bottom.
- C. Repair remaining depressions, holes, or similar voids with patch-type repairs.

- D. Clean spilled materials from adjacent surfaces immediately.
- E. Reinstall items removed for repair into original locations.

3.5 ADJUSTMENT

- A. Adjust existing and replacement operating items, hardware, and accessories for a tight fit at contact points and for smooth operation and tight closure. Lubricate hardware and moving parts.

3.6 CLEANING AND PROTECTION

- A. Protect wood surfaces from contact with contaminating substances resulting from construction operations. Monitor wood surfaces adjacent to and below exterior concrete and masonry during construction for presence of dirt, scum, alkaline deposits, stains, or other contaminants. If contaminating substances contact wood surfaces, remove contaminants immediately.
- B. Clean exposed surfaces immediately after historic wood repair. Avoid damage to coatings and finishes. Remove excess sealants, patching materials, dirt, and other substances.

END OF SECTION 060312

SECTION 064005 – CLEANING AND REFINISHING OF WOODWORK

1.01 SUMMARY

A. This procedure includes guidance on cleaning and refinishing both shellacked and varnished woodwork.

B. See other sections for general project guidelines to be reviewed along with this procedure. These guidelines cover the following sections:

1. Safety Precautions
2. Historic Structures Precautions
3. Submittals
4. Quality Assurance
5. Delivery, Storage and Handling
6. Project/Site Conditions
7. Sequencing and Scheduling
8. General Protection (Surface and Surrounding)

These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable.

1.02 SUBMITTALS

A. Product Data: Submit product data for all materials selected that will be applied to existing woodwork.

B. Operation and Maintenance Data: Submit a dust control procedure.

1.03 QUALITY ASSURANCE

A. Field Samples: A sample area shall be restored and serve as a standard of quality in restoration of wood. The sample area will be restored by means of the approved process.

B. Each sample area must receive the approval of the Architect before a general application is made.

PART 2---PRODUCTS

2.01 MATERIALS

A. Wood Stain

B. Floor Varnish

C. Shellac

D. Alcohol

E. Paste Wax - Proprietary or job-mixed compound containing carnauba, beeswax, cadelilla, or ceresin mixed with turpentine.

F. Floor Wax

G. Wood Bleach: Solution of sodium perborate, hydrogen peroxide or proprietary mixture suitable for oak.

H. Wood Filler

I. Steel Wool

J. Sandpaper: Extra Fine Grit.

PART 3--EXECUTION

3.01 PREPARATION

A. Protection: Mask all adjacent surfaces and protect other exposed surfaces in the work area.

B. Surface Preparation:

1. Select an inconspicuous area on which to test materials and application for each method type required. Test area must be approved by the Contracting Officer. After each test area has been prepared, receive approval from the Contracting Officer before commencing general application.

2. Fill any split in existing wood and sand smooth prior to sealer application.

3.02 ERECTION, INSTALLATION, APPLICATION

A. General:

1. Follow manufacturer's application instructions.

2. Final appearance of woodwork must be uniform in all respects.

B. Refinishing When Removal of Existing Shellac is Required:

1. Coat wood with denatured alcohol. Apply with soft cloth. Scrape up residue as quickly as possible. Repeat application of alcohol until all shellac is removed.

2. Sand smooth.

3. Apply one coat of shellac with soft cloth.

4. Apply mixture of shellac and alcohol with soft cloth and allow to dry overnight.

5. Apply liberal amount of paste wax with soft cloth and allow to dry.

6. Buff wood lightly with steel wool.

7. Buff wood with soft brush.
 8. Polish with soft cloth.
 9. Other processes may be used as long as final results conform to quality standards and give uniform appearance.
- C. Refinishing When Removal of Existing Wax is Required:
1. Rub wood with a soft cloth moistened in turpentine.
 2. Apply liberal amount of paste wax with soft cloth and allow to dry.
 3. Polish wood with soft cloth.
- D. Refinishing Wood Floor:
1. Remove existing finish by sanding two or three times until bare wood is exposed.
 2. Repair scratched or broken boards. Do not replace boards unless approved by the Architect.
 3. Clean area of dust and sawdust.
 4. Apply stain of same color as existing. Allow to dry overnight.
 5. Apply two coats of floor varnish.
 6. Apply two coats of floor wax.

3.04 ADJUSTING/CLEANING

- A. Wash woodwork with mild detergent and water.
- B. Dry immediately with clean cloth.
- C. Apply a liberal amount of paste wax and allow to dry.

END OF SECTION

SECTION 064216 - FLUSH WOOD PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Flush wood paneling (wood-veneer wall surfacing).
 - 2. Wood furring, blocking, shims, and hanging strips for installing flush wood paneling unless concealed within other construction before paneling installation.
 - 3. Shop finishing of flush wood paneling.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products and finishing materials and processes.
- B. Samples for Initial Selection:
 - 1. Shop-applied transparent finishes.
- C. Samples for Verification:
 - 1. Veneer-faced panel products for transparent finish, 8 by 10 inches (200 by 250 mm), for each species and cut. Include at least one face-veneer seam and finish as specified.

1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver paneling until painting and similar operations that could damage paneling have been completed in installation areas. If paneling must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

1.6 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install paneling until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.
- B. Field Measurements: Where paneling is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Established Dimensions: Where paneling is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

1.7 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that paneling can be installed as indicated.

PART 2 - PRODUCTS

2.1 PANELING FABRICATORS

- A. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of paneling.

2.2 PANELING, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of flush wood paneling (wood-veneer wall surfacing) indicated for construction, finishes, installation, and other requirements.

2.3 FLUSH WOOD PANELING (WOOD-VENEER WALL SURFACING)

- A. Grade: Match existing wood paneling.
- B. Wood Species and Cut: Match existing wood paneling..
- C. Panel-Matching Method: No matching is required between panels. Select and arrange panels for similarity of grain pattern and color between adjacent panels.
- D. Panel Core Construction: Match existing paneling..
 - 1. Thickness: Match existing paneling.

- E. Assemble panels by gluing and concealed fastening.

2.4 MATERIALS

- A. Materials, General: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
- B. Wood Moisture Content: 5 to 10 percent.
- C. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
 - 1. Medium-Density Fiberboard: ANSI A208.2, Grade 130.
 - 2. Particleboard: ANSI A208.1, Grade M-2.
 - 3. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.

2.5 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls.

2.6 FABRICATION

- A. Complete fabrication, including assembly and finishing, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

2.7 SHOP FINISHING

- A. General: Finish paneling at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing paneling, as applicable to each unit of work.
 - 1. Backpriming: Apply two coats of sealer or primer, compatible with finish coats, to concealed surfaces of paneling. Concealed surfaces of plastic-laminate-clad paneling do not require backpriming when surfaced with plastic laminate.
- C. Transparent Finish:

1. Finish: Matching finish of existing wood paneling.
2. Staining: Match existing wood paneling.
3. Open or Filled Finish for Open-Grain Woods: Match existing wood paneling.
4. Sheen: Match sheen on existing wood paneling.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition paneling to average prevailing humidity conditions in installation areas.
- B. Before installing paneling, examine shop-fabricated work for completion and complete work as required, including removal of packing and backpriming.

3.2 INSTALLATION

- A. Grade: Install paneling to comply with same grade as paneling to be installed.
- B. Install paneling level, plumb, true, and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of **1/8 inch in 96 inches (3 mm in 2400 mm)**. Install with no more than **1/16 inch in 96-inch (1.6 mm in 2400-mm)** vertical cup or bow and **1/8 inch in 96-inch (3 mm in 2400-mm)** horizontal variation from a true plane.
- C. Complete finishing work specified in this Section to extent not completed at shop or before installation of paneling. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective paneling, where possible, to eliminate defects; where not possible to repair, replace paneling. Adjust for uniform appearance.
- B. Clean paneling on exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064216

SECTION 064600 - WOOD TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:

- 1. Interior standing and running trim.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver wood trim until operations that could damage wood trim have been completed in installation areas.

1.4 FIELD CONDITIONS

- A. Environmental Limitations for Interior Work: Do not deliver or install interior wood trim until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

1.5 COORDINATION

- A. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of Work specified in other Sections to ensure that wood trim can be supported and installed as indicated.

PART 2 - PRODUCTS

2.1 WOOD TRIM, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of wood trim indicated for construction, finishes, installation, and other requirements.

1. Provide labels from AWI certification program indicating that woodwork complies with requirements of grades specified.

2.2 INTERIOR STANDING AND RUNNING TRIM FOR TRANSPARENT FINISH

- A. Grade: Premium.
- B. Certified Wood: Interior trim for transparent finish shall be certified as "FSC Pure" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- C. Wood Species and Cut: Match species and cut indicated for other types of transparent-finished architectural woodwork located in same area of building unless otherwise indicated.

2.3 WOOD MATERIALS

- A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of wood trim and quality grade specified unless otherwise indicated.

1. Wood Moisture Content for Interior Materials: 5 to 10 percent.

2.4 MISCELLANEOUS MATERIALS

- A. Interior Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber kiln dried to less than 15 percent moisture content.
- B. Provide self-drilling screws for metal-framing supports, as recommended by metal-framing manufacturer.
- C. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.

2.5 FABRICATION

- A. Fabricate wood trim to dimensions, profiles, and details indicated.

2.6 SHOP FINISHING

- A. General: Finish wood trim at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.

- B. General: Shop finish transparent-finished wood trim at fabrication shop as specified in this Section. Refer to [Section 099113 "Exterior Painting"] [and] [Section 099123 "Interior Painting"] for field finishing opaque-finished wood trim.
- C. General: Drawings indicate items that are required to be shop finished. Finish such items at fabrication shop as specified in this Section. Refer to [Section 099113 "Exterior Painting"] [Section 099123 "Interior Painting"] [and] [Section 099300 "Staining and Transparent Finishing"] for field finishing wood trim not indicated to be shop finished.
- D. Finish Materials: Use finish materials that meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing wood trim, as applicable to each unit of work.
 - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of wood trim. Apply two coats to end-grain surfaces.
- F. Transparent Finish for Exterior Trim: Comply with Section 099300 "Staining and Transparent Finishing."
- G. Transparent Finish for Interior Trim:
 - 1. Grade: Premium.
 - 2. Finish: To match existing wood trim.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before installation, condition wood trim to average prevailing humidity conditions in installation areas.
- B. Before installing architectural wood trim, examine shop-fabricated work for completion and complete work as required, including removal of packing.

3.2 INSTALLATION

- A. Grade: Install wood trim to comply with same grade as item to be installed.
- B. Assemble wood trim and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install wood trim level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).

- D. Scribe and cut wood trim to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor wood trim to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 60 inches (1500 mm) long except where shorter single-length pieces are necessary.
 - 1. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches (3 mm in 2400 mm).
- G. Touch up finishing work specified in this Section after installation of wood trim. Fill nail holes with matching filler where exposed.
 - 1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are applied in shop.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective wood trim, where possible, to eliminate functional and visual defects; where not possible to repair, replace wood trim. Adjust joinery for uniform appearance.
- B. Clean wood trim on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 064600

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:
 - 1. Glass-fiber blanket insulation.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. CertainTeed Corporation.
 - 2. Guardian Building Products, Inc.
 - 3. Johns Manville.
 - 4. Knauf Insulation.

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

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation vapor retarders, including removing projections capable of puncturing vapor retarders, or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Glass-Fiber or Mineral-Wool Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
 2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.

3. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.

- C. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Loose-Fill Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).
2. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 PROTECTION

- A. Protect installed insulation and vapor retarders from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

SECTION 072129 - SPRAYED INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Spray polyurethane foam insulation.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

PART 2 - PRODUCTS

2.1 SPRAY POLYURETHANE FOAM INSULATION

- A. Open-Cell Polyurethane Foam Insulation: Spray-applied polyurethane foam using water as a blowing agent, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
 - 1. Minimum density of 0.4 lb/cu. ft. (6.4 kg/cu. m), thermal resistivity of 3.4 deg F x h x sq. ft./Btu x in. at 75 deg F (24 K x m/W at 24 deg C).

PART 3 - EXECUTION

3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

3.3 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.
- B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

1. Spray Polyurethane Insulation: Apply according to manufacturer's written instructions.

3.4 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072129

SECTION 075116 - BUILT-UP COAL TAR ROOFING & ROOF INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:
 - 1. Built-up coal-tar roofing.
 - 2. Roof insulation.

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary of NRCA's "The NRCA Roofing and Waterproofing Manual" apply to Work of this Section.
- B. Bitumen: A generic term for either asphalt or coal-tar pitch.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Verification: For the following products:
 - 1. Flashing sheet, of color required.
 - 2. Aggregate surfacing material in gradation and color required.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For built-up roofing to include in maintenance manuals.

1.6 QUALITY ASSURANCE

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

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 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 FIELD CONDITIONS

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

1.9 WARRANTY

- A. Standard Warranty: Manufacturer agrees to repair or replace components of built-up roofing that fail in materials or workmanship within standard warranty period.
 - 1. Standard warranty includes built-up roofing membrane, base flashings, roof insulation, fasteners, roofing accessories, and other components of built-up roofing.
 - 2. Warranty Period: Manufacturer's standard warranty period shall not be less than required elsewhere in the Contract Documents for the Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Durapax LLC.
 - 2. Koppers Inc.

3. Viridian Systems.

- B. Source Limitations: Obtain components including roof insulation, fasteners and accessories for built-up roofing from same manufacturer as built-up roofing or manufacturer approved by built-up roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed built-up 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. Built-up roofing and base flashings shall remain watertight.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by built-up roofing manufacturer based on testing and field experience.

2.3 BASE FLASHING SHEET MATERIALS

- A. Backer Sheet: Roofing manufacturer's standard spun-bonded, nonwoven, polyester-reinforced fabric, of standard color and weight, suitable for application method specified.
- B. Granule-Surfaced Flashing Sheet: ASTM D 6164/D 6164M, Grade G, Type I or II, polyester-reinforced, SBS-modified asphalt sheet; granule-surfaced base flashing; suitable for application method specified, and as follows:
 - 1. Granule Color: Gray.
- C. Polyester Flashing Sheet: Roofing manufacturer's standard asphalt-coated, polyester-reinforced fabric, base flashing, suitable for application method specified.
- D. Fabric Termination: Roofing manufacturer's standard polyester cloth, suitable for application and for reinforcing top seal of base flashing.

2.4 BITUMEN MATERIALS

- A. Coal-Tar Primer: ASTM D 43.
- B. Coal-Tar Pitch: ASTM D 450, Type I.

2.5 STONE BALLAST

- A. Water-worn stone.

2.6 AUXILIARY BUILT-UP ROOFING MATERIALS

- A. General: Auxiliary materials recommended by built-up roofing manufacturer for intended use and compatible with built-up roofing.
 - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
 - 2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content:
 - a. Plastic Foam Adhesives: 50 g/L.
 - b. Gypsum Board and Panel Adhesives: 50 g/L.
 - c. Multipurpose Construction Adhesives: 70 g/L.
 - d. Fiberglass Adhesives: 80 g/L.
 - e. Contact Adhesives: 80 g/L.
 - f. Other Adhesives: 250 g/L.
 - g. Nonmembrane Roof Sealants: 300 g/L.
 - h. Sealant Primers for Nonporous Substrates: 250 g/L.
 - i. Sealant Primers for Porous Substrates: 775 g/L.
- B. Cold-Applied Adhesive: Roofing manufacturer's standard asphalt-based, one- or two-part, asbestos-free, cold-applied adhesive specially formulated for compatibility and use with built-up base flashings.
- C. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required by roofing manufacturer for application.
- D. SBS-Modified Asphalt Flashing Cement: Roofing manufacturer's standard, asbestos free, of consistency required for application.
- E. Coal-Tar Roofing Cement: ASTM D 5643, coal-tar-based roofing cement, asbestos free.
- F. Metal Termination Bars: Roofing manufacturer's standard predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick; with anchors.
- G. Roof Coatings: ASTM D 6083, acrylic elastomer emulsion coating, formulated for use on bituminous roof surfaces.
 - 1. Color: Gray.
- H. Aggregate Surfacing: ASTM D 1863, No. 6 or No. 67, clean, dry, opaque, water-worn gravel or crushed stone, free of sharp edges.
- I. Miscellaneous Accessories: Provide those recommended by roofing system manufacturer.

2.7 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated.

- B. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/8 inch per 12 inches (1:96), or 1/4 inch per 12 inches (1:48) unless otherwise indicated.
- C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.8 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatible with built-up roofing.
- B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate, full-spread application.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
 - 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
 - 2. Verify that deck is securely fastened with no projecting fasteners and with no adjacent units in excess of 1/16 inch (1.6 mm) out of plane relative to adjoining deck.
- 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 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.

3.3 INSTALLATION, GENERAL

- A. Comply with built-up roofing manufacturer's written instructions.
- B. Bitumen Heating: Heat bitumen to its equiviscous temperature, measured at the mop cart or mechanical spreader immediately before application. Circulate bitumen during heating. Do not raise bitumen temperature above equiviscous temperature range more than one hour before time of application. Do not exceed bitumen manufacturer's recommended temperature limits during bitumen heating. Do not heat

bitumen within 25 deg F (14 deg C) of flash point. Discard bitumen maintained for more than four hours at a temperature exceeding 325 deg F (163 deg C) for coal-tar pitch.

- C. Substrate-Joint Penetrations: Prevent roofing asphalt and adhesives from penetrating substrate joints, entering building, or damaging built-up roofing components or adjacent building construction.

3.4 SUBSTRATE BOARD INSTALLATION

- A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
- B. Install tapered insulation under area of roofing to conform to slopes indicated.
- C. 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 (6 mm) with insulation.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.
- F. Install tapered edge strips at perimeter edges of roof that do not terminate at vertical surfaces.
- G. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:
 - 1. Set each layer of insulation in a uniform coverage of full-spread insulation adhesive, firmly pressing and maintaining insulation in place.
- H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches (150 mm) in each direction. Loosely butt cover boards together. Tape joints if required by roofing manufacturer. Retain one of first two subparagraphs below if fastening rather than adhering cover boards.
 - 1. Fasten cover boards to resist uplift pressure at corners, perimeter, and field of roof.

3.5 BUILT-UP ROOFING INSTALLATION, GENERAL

- A. Install roofing according to roofing manufacturer's written instructions and applicable recommendations of ARMA/NRCA's "Quality Control Guidelines for the Application of Built-up Roofing."

- B. Coordinate installation of built-up roofing so insulation and other components of built-up roofing 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 built-up roofing sheets and insulation with a course of coated felt set in roofing cement or hot roofing asphalt, with joints and edges sealed.
 - 2. Complete terminations and base flashings, and provide temporary seals to prevent water from entering completed sections of roofing system.
 - 3. Remove and discard temporary seals before beginning work on adjoining roofing.

3.6 FLASHING AND STRIPPING INSTALLATION

- A. Install base flashing over cant strips and other sloping and vertical surfaces, at roof edges, and at penetrations through roof; secure to substrates according to built-up roofing manufacturer's written instructions.
- B. Mechanically fasten top of base flashing securely at terminations and perimeter of roofing.
 - 1. Securely fasten top termination of base flashing with continuous metal termination bar anchored into substrate.
 - 2. Seal top termination of base flashing.
- C. Apply roof coatings to smooth base flashings according to manufacturer's written instructions, by spray, roller, or other suitable application method.
- D. Install stripping according to roofing system manufacturer's written instructions, where metal flanges and edgings are set on built-up roofing.
- E. Roof Drains: Set 30-by-30-inch (760-by-760-mm) metal flashing in bed of asphalt roofing cement on completed built-up roofing. Cover metal flashing with built-up roofing cap-sheet stripping, and extend a minimum of 6 inches (150 mm) beyond edge of metal flashing onto field of built-up roofing. Clamp built-up roofing, metal flashing, and stripping into roof-drain clamping ring.
- F. Stone Ballast: Lay water-worn stone out evenly and in manner that does not block water flow to the roof drains.

3.7 PROTECTING AND CLEANING

- A. Protect built-up roofing from damage and wear during remainder of construction period. When remaining construction does 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 built-up roofing that does not comply with requirements, repair substrates, and repair or reinstall 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.

END OF SECTION 075116

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:

- 1. Formed roof-drainage sheet metal fabrications.
- 2. Formed low-slope roof sheet metal fabrications.

1.3 COORDINATION

- A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.
- B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 ACTION SUBMITTALS

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

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

1.5 CLOSEOUT SUBMITTALS

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

1.6 QUALITY ASSURANCE

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

1.7 DELIVERY, STORAGE, AND HANDLING

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.
- B. Sheet Metal Standard for Flashing and Trim: Comply with NRCA's "The NRCA Roofing Manual" and SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

2.2 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.
 - 1. As-Milled Finish: Mill.

2.3 UNDERLAYMENT MATERIALS

- A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.
- B. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry, metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.
 - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.
- C. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.
 - 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
- D. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.
- E. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- F. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.[Rivet joints where necessary for strength.]

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Refer to 057500 Decorative Formed Metal for aluminum fascia fabrication.

- B. Roof Edge Flashing (Gravel Stop): Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates.
 - 1. Joint Style: Overlapped, 4 inches (100 mm) wide
 - 2. Fabricate from the Following Materials:
 - a. Aluminum: 0.050 inch (1.27 mm thick).

- C. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, fasten and seal watertight.
 - 1. Coping Profile: according to SMACNA's "Architectural Sheet Metal Manual."
 - 2. Joint Style: Butted with expansion space and 6-inch- (150-mm-) wide, concealed backup plate
 - 3. Fabricate from the Following Materials:
 - a. Aluminum: 0.050 inch (1.27 mm) thick.

- D. Roof and Roof-to-Roof Edge-Flashing (Gravel-Stop) Transition, Roof-to-Roof Edge-Flashing (Gravel-Stop) and Fascia-Cap Transition Expansion-Joint Cover: Fabricate from the following materials:
 - 1. Aluminum: 0.050 inch (1.27 mm) thick.

- E. Base Flashing: Fabricate from the following materials:
 - 1. Aluminum: 0.040 inch (1.02 mm) thick.

- F. Counterflashing: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.

- G. Flashing Receivers: Fabricate from the following materials:
 - 1. Aluminum: 0.032 inch (0.81 mm) thick.

- H. Roof-Penetration Flashing: Fabricate from the following materials:
 - 1. Galvanized Steel: [0.028 inch (0.71 mm)] <Insert dimension> thick.

- I. Roof-Drain Flashing: Fabricate from the following materials:
 - 1. Stainless Steel: [0.016 inch (0.40 mm)] <Insert dimension> thick.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
 - 3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches (300 mm) apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.
 - 5. Torch cutting of sheet metal flashing and trim is not permitted.
 - 6. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.
 - 1. Coat concealed side of uncoated-aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.

2. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
 1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
 2. Use lapped expansion joints only where indicated on Drawings.
- D. Fasteners: Use fastener sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance
- E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.
- F. Seal joints as required for watertight construction.
 1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.
 1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at] 16-inch (400-mm) centers.
 2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at 24-inch (600-mm) centers.

- D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.
- E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm). Secure in waterproof manner by means of snap-in installation and sealant or lead wedges and sealant unless otherwise indicated.
- F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

3.6 CLEANING AND PROTECTION

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

END OF SECTION 076200

SECTION 077100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:
 - 1. Roof drains.
 - 2. Flashing materials.
 - 3. Brass water spouts (at Canopies)

1.3 ACTION SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. Drainage piping specialties shall bear label, stamp, or other markings of specified testing agency.

PART 2 - PRODUCTS

2.1 METAL ROOF DRAINS

- A. **Buy America:** Products in this section are subject to Buy America coverage.
- B. Cast-Iron, General-Purpose Roof Drains:
 - 1. Manufacturers: Subject to compliance with requirements.
 - 2. Compliance: ANSI/ASME A112.6.4-2003,
 - 3. Body: Powder coated, ASTM A 48, Class 25 cast iron body with anchor flange and fully cast sump which includes the outlet within the casting. Smooth sump walls for maximum flow ability no boss obstructions. Bolts holes drilled and tapped to 1.5" depth
 - 4. Dome Strainer: Cast Iron strainer, vandal proof.
 - 5. Membrane Clamp Ring: 2.375-inch (61-mm) wide, ASTM A 48, Class 25 cast iron, waterproofing membrane clamp ring with 1.25" min. high integral gravel stop. 4 bolt anchorage and .25" nominal drainage free area height.

6. Pipe Size: 3 inches (76 mm), 4 inches (100 mm), 5 inches (127 mm) and 6 inches (152 mm)
7. Drain bolts 1.5" long threaded length with anti-seize pre-applied to threads
8. Outlet: Bottom.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install roof drains at low points of roof areas according to roof membrane manufacturer's written installation instructions.
 1. Install flashing collar or flange of roof drain to prevent leakage between drain and adjoining roofing. Maintain integrity of waterproof membranes where penetrated.
 2. Position roof drains for easy access and maintenance.

3.2 CONNECTIONS

- A. Comply with requirements for piping specified in Section 221413 "Facility Storm Drainage Piping." Drawings indicate general arrangement of piping, fittings, and specialties.

3.3 FLASHING INSTALLATION

- A. Fabricate flashing from single piece of metal unless large pans, sumps, or other drainage shapes are required.
- B. Install sheet flashing on pipes, sleeves, and specialties passing through or embedded roofs with waterproof membrane.
 1. Pipe Flashing: Sleeve type, matching the pipe size, with a minimum length of 10 inches (250 mm) and with skirt or flange extending at least 8 inches (200 mm) around pipe.
 2. Sleeve Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around sleeve.
 3. Embedded Specialty Flashing: Flat sheet, with skirt or flange extending at least 8 inches (200 mm) around specialty.
- C. Set flashing on roofs in solid coating of bituminous cement.
- D. Secure flashing into sleeve and specialty clamping ring or device.

3.4 PROTECTION

- A. Protect drains during remainder of construction period to avoid clogging with dirt or debris and to prevent damage from traffic or construction work.

- B. Place plugs in ends of uncompleted piping at end of each day or when work stops.

END OF SECTION 221423

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract..

1.2 SUMMARY

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
 - 1. Product Data for Credit IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.
 - 2. Laboratory Test Reports for Credit IEQ 4: For sealants and sealant primers used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint-Sealant Schedule: Include the following information:
 - 1. Joint-sealant application, joint location, and designation.
 - 2. Joint-sealant manufacturer and product name.
 - 3. Joint-sealant formulation.
 - 4. Joint-sealant color.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

- B. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificate: For each sealant specified to be validated by SWRI's Sealant Validation Program.

1.5 QUALITY ASSURANCE

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

1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
 - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer or are below 40 deg F (5 deg C).
 - 2. When joint substrates are wet.
 - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
 - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

- A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.
 - 1. Products: Subject to compliance with requirements.

- B. Single-Component, Nonsag, Traffic-Grade, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use T.

- 1. Products: Subject to compliance with requirements.

- C. Mildew-Resistant, Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

- 1. Products: Subject to compliance with requirements.

2.3 LATEX JOINT SEALANTS

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

- 1. Products: Subject to compliance with requirements.

2.4 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

2.5 MISCELLANEOUS MATERIALS

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

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

- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:
 - a. Concrete.
 - b. Masonry.
 3. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
1. Place sealants so they directly contact and fully wet joint substrates.
 2. Completely fill recesses in each joint configuration.
 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
1. Remove excess sealant from surfaces adjacent to joints.
 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 CLEANING

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

3.5 PROTECTION

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

3.6 JOINT-SEALANT SCHEDULE

- A. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
 - 1. Joint Locations:
 - a. Isolation and contraction joints in cast-in-place concrete slabs.
 - b. Other joints as indicated.
 - 2. Silicone Joint Sealant: Single component, nonsag, traffic grade, neutral curing.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- B. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Locations:
 - a. Control and expansion joints in unit masonry.
 - b. Perimeter joints between materials listed above and frames of doors, and windows.
 - 2. Silicone Joint Sealant: Single component, nonsag, neutral curing, Class 100/50.
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

- C. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.
 - 1. Joint Sealant Location:
 - a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
 - 2. Joint Sealant: Mildew resistant, single component, nonsag, neutral curing, Silicone
 - 3. Joint-Sealant Color: As selected by Architect from manufacturer's full range of colors.

END OF SECTION 079200

SECTION 081213 - HOLLOW METAL FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes hollow-metal frames.
- B. Related Requirements:
 - 1. Section 081416 "Flush Wood Doors" for wood doors installed in hollow-metal frames.

1.3 DEFINITIONS

- A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.4 COORDINATION

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and finishes.
- B. Shop Drawings: Include the following:
 - 1. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
 - 2. Locations of reinforcement and preparations for hardware.
 - 3. Details of each different wall opening condition.
 - 4. Details of anchorages, joints, field splices, and connections.
 - 5. Details of moldings, removable stops, and glazing.
 - 6. Details of conduit and preparations for power, signal, and control systems.

- C. Samples for Verification: Prepare Samples to demonstrate compliance with requirements for quality of materials and construction. Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.
 - 1. Provide additional protection to prevent damage to factory-finished units.
- B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.
- C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each unit to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

2.2 INTERIOR FRAMES

- A. **Buy America:** Products in this section are subject to Buy America coverage.
- B. Construct interior frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.
- C. Heavy-Duty Frames: SDI A250.8, Level 2..
 - 1. Physical Performance: Level B according to SDI A250.4.
 - 2. Materials: Uncoated steel sheet, minimum thickness of 0.053 inch (1.3 mm).
 - 3. Construction: Knocked down and Full profile welded as indicated in schedule.
 - 4. Exposed Finish: Prime.

2.3 FRAME ANCHORS

- A. Jamb Anchors:
 - 1. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer

from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

2.4 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.
- B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- C. Frame Anchors: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.
- D. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- E. Power-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching hollow-metal frames of type indicated.

2.5 FABRICATION

- A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Hollow-Metal Frames: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.
 - 1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
 - 2. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
 - 3. Jamb Anchors: Provide number and spacing of anchors as follows:
 - a. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.
 - 4. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers as follows. Keep holes clear during construction.
 - a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.
- C. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.

1. Reinforce frames to receive nontemplated, mortised, and surface-mounted hardware.
2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.6 STEEL FINISHES

- A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
 1. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Drill and tap frames to receive nontemplated, mortised, and surface-mounted hardware.

3.3 INSTALLATION

- A. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.
- B. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
 - a. Remove temporary braces necessary for installation only after frames have been properly set and secured.
 - b. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
2. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
3. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
 - a. Squareness: Plus or minus **1/16 inch (1.6 mm)**, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
 - b. Alignment: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs on a horizontal line parallel to plane of wall.
 - c. Twist: Plus or minus **1/16 inch (1.6 mm)**, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
 - d. Plumbness: Plus or minus **1/16 inch (1.6 mm)**, measured at jambs at floor.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.
- B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

END OF SECTION 081213

SECTION 081416 - FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Solid-core doors with wood-veneer faces.
 - 2. Factory finishing flush wood doors.
 - 3. Factory fitting flush wood doors to frames and factory machining for hardware.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door. Include details of core and edge construction.[
- B. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; and the following:
 - 1. Dimensions and locations of blocking.
 - 2. Dimensions and locations of mortises and holes for hardware.
 - 3. Dimensions and locations of cutouts.
 - 4. Undercuts.
 - 5. Requirements for veneer matching.
 - 6. Doors to be factory finished and finish requirements.
- C. Samples for Initial Selection: For factory-finished doors.
- D. Samples for Verification:
 - 1. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
 - a. Provide Samples for each species of veneer and solid lumber required.
 - b. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Comply with requirements of referenced standard and manufacturer's written instructions.

- B. Package doors individually in plastic bags or cardboard cartons.

1.5 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install doors until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during remainder of construction period.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain flush wood doors from single manufacturer.

2.2 FLUSH WOOD DOORS, GENERAL

- A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."
- B. WDMA I.S.1-A Performance Grade: Heavy Duty.
- C. Particleboard-Core Doors:
 - 1. Particleboard: ANSI A208.1, Grade LD-2.
 - 2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.

2.3 VENEER-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
 - 1. Grade: Premium, with Grade A faces.
 - 2. Species: Match existing flush wood doors.
 - 3. Cut: Match existing flush wood doors.
 - 4. Match between Veneer Leaves: Same as match of existing flush wood doors.
 - 5. Exposed Vertical Edges: Same species as faces or a compatible species - edge Type A.
 - 6. Core: Particleboard.
 - 7. Construction: Five or seven plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering.
 - 8. WDMA I.S.1-A Performance Grade: [Heavy Duty.

2.4 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
- B. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame Shop Drawings, BHMA-156.115-W, and hardware templates.
 - 1. Coordinate with hardware mortises in metal frames to verify dimensions and alignment before factory machining.

2.5 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
 - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Factory finish doors.
- C. Transparent Finish:
 - 1. Grade: Premium.
 - 2. Finish: AWI's, AWMAC's, and WI's "Architectural Woodwork Standards" System 5, conversion varnish.
 - 3. Staining: Match existing flush wood doors.
 - 4. Effect: Match existing flush wood doors..
 - 5. Sheen: Match existing flush wood doors..

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
 - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
 - 2. Reject doors with defects.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Hardware: For installation, see Section 087100 "Door Hardware."]

- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
- C. Job-Fitted Doors: Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted for fire-rated doors. Machine doors for hardware. Seal edges of doors, edges of cutouts, and mortises after fitting and machining.
 - 1. Clearances: Provide **1/8 inch (3.2 mm)** at heads, jambs, and between pairs of doors. Provide **1/8 inch (3.2 mm)** from bottom of door to top of decorative floor finish or covering unless otherwise indicated. Where threshold is shown or scheduled, provide **1/4 inch (6.4 mm)** from bottom of door to top of threshold unless otherwise indicated.
- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

3.3 ADJUSTING

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Replace doors that are damaged or that do not comply with requirements. Doors may be repaired or refinished if Work complies with requirements and shows no evidence of repair or refinishing.

END OF SECTION 081416

SECTION 083113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract..

1.2 SUMMARY

- A. Section Includes:

- 1. Floor access doors and frames.

1.3 ACTION SUBMITTALS

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

- 1. Include construction details, materials, individual components and profiles, and finishes.

PART 2 - PRODUCTS

2.1 FLOOR ACCESS DOORS AND FRAMES

- A. **Buy America:** Steel products in this section are subject to Buy America coverage.

- B. Basis-of-Design Products: APS-300 (U.S.F. Fabrication) or FA-300 (Acudor Products, Inc). Subject to compliance with requirements, provide product indicated or comparable product by one of the following:

- 1. Access Panel Solutions.
- 2. Acudor Products, Inc.
- 3. Alfab, Inc.
- 4. Babcock-Davis.
- 5. Cendrex Inc.
- 6. Elmdor/Stoneman Manufacturing Co.; Div. of Acorn Engineering Co.
- 7. Jensen Industries; Div. of Broan-Nutone, LLC.
- 8. J. L. Industries, Inc.; Div. of Activar Construction Products Group.
- 9. Karp Associates, Inc.
- 10. Larsen's Manufacturing Company.
- 11. Maxam Metal Products Limited.
- 12. Metropolitan Door Industries Corp.
- 13. MIFAB, Inc.

14. Milcor Inc.
 15. Nystrom, Inc.
 16. U.S.F. Fabrication
 17. Williams Bros. Corporation of America (The).
- C. Floor Doors, General: Equip each door with adjustable counterbalancing springs, heavy-duty hold-open arm that automatically locks door open at 90 degrees, release handle with red vinyl grip that allows for one-handed closure, and recessed lift handle.
- D. Flush Access Doors with Exposed Flanges :
1. Assembly Description: Fabricate door to fit flush to frame. Provide manufacturer's standard-width exposed flange, proportional to door size.
 2. Locations: Floor
 3. Door Size: See drawings
 4. Aluminum Sheet for Door: Nominal 0.25 inch (6 mm)
 5. Frame Material: Aluminum or steel
 6. Hinges: Manufacturer's standard
 7. Hardware: Latch
- E. Hardware:
1. Latch: Slam latch

2.2 MATERIALS

- A. **Buy America:** Steel products in this section are subject to Buy America coverage.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- D. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- E. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
- F. Rolled-Stainless-Steel Floor Plate: ASTM A 793, manufacturer's standard finish.
- G. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304, Type 316. Remove tool and die marks and stretch lines or blend into finish.
- H. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
- I. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.

- J. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than strength and durability properties of Alloy 5005-H15; with minimum sheet thickness according to ANSI H35.2 (ANSI H35.2M).
- K. Frame Anchors: Same type as door face.
- L. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
- E. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Aluminum Finishes:
 - 1. Mill finish.
 - 2. Clear Anodic Finish: AAMA 611, [AA-M12C22A41, Class I, 0.018 mm] [AA-M12C22A31, Class II, 0.010 mm] or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.3 ADJUSTING

- A. Adjust doors and hardware, after installation, for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 083113

SECTION 085113 - ALUMINUM STORM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section includes aluminum storm windows for interior application at exterior locations.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components.
 - 3. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
 - 4. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples for Initial Selection: For units with factory-applied color finishes.
- D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer and Installer.
- B. Sample Warranties: For manufacturer's warranties.

1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer capable of fabricating aluminum windows that meet or exceed performance requirements indicated and of documenting this performance by test reports, and calculations.
- B. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockup of typical wall area as shown on Drawings.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Failure to meet performance requirements.
 - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
 - c. Faulty operation of movable sash and hardware.
 - d. Deterioration of materials and finishes beyond normal weathering.
 - e. Failure of insulating glass.
 - 2. Warranty Period: Manufacturer's standard warranty period shall not be less than required elsewhere in the Contract Documents for the Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Allied Window, Inc., Energy Saving Storm Window for Commercial and Residential
2. Mon-Ray, Inc., High Performance Storm Windows for Interior Application
3. Innerglass Window Systems, LLC

- B. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/I.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: AMMA certified with label attached to each window.

- B. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of 0.30 Btu/sq. ft. x h x deg F (1.71 W/sq. m x K)

- C. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of 0.40

- D. Condensation-Resistance Factor (CRF): Provide aluminum windows tested for thermal performance according to AAMA 1503, showing a CRF of 45

- E. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

2.3 ALUMINUM WINDOWS

- A. Operating Types: Provide the following operating types in locations indicated on Drawings:

1. Hopper: Project in.
2. Double hung.

- B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.

1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.

- C. Glass: Clear annealed glass, ASTM C 1036, Type 1, Class 1, q3.

1. Kind: Fully tempered where required by code

- D. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal
 - 1. Single Glazing
 - E. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
 - 1. Exposed Hardware Color and Finish: Clear Anodized
 - F. Projected Window Hardware:
 - 1. Hinges: Non-friction type, not less than two per sash
 - 2. Lock: Lever handle and cam-action lock with keeper
 - 3. Limit Devices: Concealed friction adjustor, adjustable stay barlimit devices designed to restrict sash opening.
 - a. Limit clear opening to 4 inches (100 mm) for ventilation; with custodial key release.
 - G. Hung Window Hardware:
 - 1. Counterbalancing Mechanism: Complying with AAMA 902, concealed, of size and capacity to hold sash stationary at any open position.
 - 2. Locks and Latches: Allow unobstructed movement of the sash across adjacent sash in direction indicated and operated from the inside only.[Provide custodial locks.]
 - H. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.
 - I. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
 - 1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.
- 2.4 INSECT SCREENS
- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
 - 1. Type and Location: See drawings
 - B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.

1. Tubular Framing Sections and Cross Braces: Roll formed from aluminum sheet.

C. Aluminum Wire Fabric: 18-by-16 (1.1-by-1.3-mm) mesh of 0.011-inch- (0.28-mm-) diameter, coated aluminum wire.

1. Wire-Fabric Finish: Natural bright

2.5 FABRICATION

A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.

B. Glaze aluminum windows in the factory.

C. Weather strip each operable sash to provide weathertight installation.

D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.

E. Provide water-shed members above side-hinged sashes and similar lines of natural water penetration.

F. Mullions: Provide mullions and cover plates, matching window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections, as indicated. Provide mullions and cover plates capable of withstanding design wind loads of window units.

G. Window Assemblies: Provide operating units in configuration indicated. Provide window frames, sashes, hardware, and other trim and components necessary for a complete, secure, and weathertight installation.

H. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

2.6 GENERAL FINISH REQUIREMENTS

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

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

C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.
- C. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 611.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

3.3 FIELD QUALITY CONTROL

- A. Remove and replace noncomplying windows and retest as specified above.

- B. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- C. Prepare test and inspection reports.

3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
 - 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 085113

SECTION 086300 - METAL-FRAMED SKYLIGHTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section includes skylights with metal framing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for metal-framed skylights.
- B. Shop Drawings: For metal-framed skylights. Include sections, details, and attachments to other work.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Welding certificates.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of metal-framed skylights required for this Project.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for skylights' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including testing conducted by an independent testing agency and in-service performance.
 - 1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.

- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
- D. Structural-Sealant Glazing: Comply with recommendations in ASTM C 1401, "Guide for Structural Sealant Glazing," for joint design and quality-control procedures.
 - 1. Joint designs are reviewed and approved by structural-sealant manufacturer.
 - 2. Quality-control program development and reporting comply with ASTM C 1401 recommendations for material qualification procedures, preconstruction sealant-testing program, and procedures and intervals for fabrication and installation reviews and checks.
 - 3. Perform manufacturer's standard tests for compatibility and adhesion of sealants with each material that will come in contact with sealants.

1.6 WARRANTY

- A. Standard Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal-framed skylights which fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including, but not limited to, excessive deflection.
 - b. Noise or vibration caused by thermal movements.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
 - d. Adhesive or cohesive sealant failures.
 - e. Water leakage.
 - 2. Warranty Period: Manufacturer's standard warranty period shall not be less than required elsewhere in the Contract Documents for the Project.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. Wasco-Lite, Inc.
 - 2. Skylight Concepts, Inc.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Metal-framed skylights shall withstand the effects of the following without failure due to defective manufacture, fabrication, installation, or other defects in construction:

1. Structural loads.
 2. Thermal movements.
 3. Movements of supporting structure.
 4. Dimensional tolerances of support system and other adjacent construction.
 5. Failure includes, but is not limited to, the following:
 - a. Deflection exceeding specified limits.
 - b. Thermal stresses transferring to building structure.
 - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
 - d. Glazing-to-glazing contact.
 - e. Noise or vibration created by wind and by thermal and structural movements.
 - f. Loosening or weakening of fasteners, attachments, and other components.
 - g. Sealant failure.
- B. Water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
- C. Water Penetration under Dynamic Pressure: Provide metal-framed skylights that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
- D. Thermal Movements: Provide metal-framed skylights that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
- E. Condensation Resistance: Provide metal-framed skylights with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.
- F. Structural Sealant: Capable of withstanding tensile and shear stresses imposed without failing adhesively or cohesively. When tested for preconstruction adhesion and compatibility, cohesive failure of sealant shall occur before adhesive failure.
- G. Energy Performance: Provide metal-framed skylights with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. Thermal Transmittance (U-Factor): Fixed glazing and framing areas shall have U-factor of not more than 0.80 Btu/sq. ft. x h x deg F (4.54 W/sq. m x K) as determined according to NFRC 100.
 2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.6 as determined according to NFRC 200.

2.3 FRAMING SYSTEMS

- A. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.
 - 1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
 - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
 - 3. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
 - 4. Structural Profiles: ASTM B 308/B 308M.
 - 5. Welding Rods and Bare Electrodes: AWS A5.10/A5.10M.
- B. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.
 - 1. Include snap-on aluminum trim that conceals fasteners.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning skylight components.
- D. Fasteners and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
 - 1. At pressure caps, use ASTM A 193/A 193M stainless-steel screws.
 - 2. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
 - 3. Reinforce members as required to receive fastener threads.
 - 4. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system, fabricated from Series 300 stainless steel.
- E. Anchor Bolts: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6), galvanized steel.
- F. Concealed Flashing: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials
- G. Exposed Flashing and Closures: Manufacturer's standard aluminum components not less than 0.030 inch (0.762 mm).
- H. Framing Gaskets: Manufacturer's standard.
- I. Framing Sealants: As recommended in writing by manufacturer.
- J. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

2.4 GLAZING

- A. Glazing: Plastic
- B. Glazing Sealants: As recommended in writing by manufacturer.

2.5 FABRICATION

- A. Where practical, fit and assemble metal-framed skylights in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
- B. Fabricate aluminum components that, when assembled, have the following characteristics:
 - 1. Profiles that are sharp, straight, and free of defects or deformations.
 - 2. Accurately fitted joints with ends coped or mitered.
 - 3. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within skylight to exterior.
 - 4. Physical and thermal isolation of glazing from framing members.
 - 5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
- C. Fabricate aluminum sill closures with weep holes and for installation as continuous component.
- D. Reinforce aluminum components as required to receive fastener threads.
- E. Weld aluminum components in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- F. Factory-Glazed, Metal-Framed Skylights:
 - 1. Factory installed plastic glazing to comply with requirements.
- G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.6 ALUMINUM FINISHES

- A. As recommended by manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
7. Seal joints watertight unless otherwise indicated.

B. Metal Protection: Where aluminum will contact dissimilar materials, protect against galvanic action by painting contact surfaces with protective coating or by installing nonconductive spacers as recommended in writing by manufacturer for this purpose.

C. Install continuous aluminum sill closure with weatherproof expansion joints and locked and sealed or welded corners. Locate weep holes at rafters.

D. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within skylight to exterior.

E. Install components plumb and true in alignment with established lines and elevations.

END OF SECTION 086300

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract

1.2 SUMMARY

- A. Section includes:
 - 1. Mechanical door hardware for the following:
 - a. Swinging doors.
 - 2. Electrified door hardware.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: Details of electrified door hardware, indicating the following:
 - 1. Wiring Diagrams: For power, signal, and control wiring and including the following:
 - a. Details of interface of electrified door hardware.
 - b. Schematic diagram of systems that interface with electrified door hardware.
- C. Samples for Initial Selection: For plastic protective trim units in each finish, color, and texture required for each type of trim unit indicated.
- D. Other Action Submittals:
 - 1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
 - a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
 - b. Content: Include the following information:

- 1) Identification number, location, hand, size, and material of each door and frame.
 - 2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
 - 3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
 - 4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
 - 5) Fastenings and other pertinent information.
 - 6) Mounting locations for door hardware.
 - 7) List of related door devices specified in other Sections for each door and frame.
2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks. Include schematic keying diagram and index each key set to unique door designations that are coordinated with the Contract Documents.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For electrified door hardware, from the manufacturer.
- B. Product Test Reports: For compliance with accessibility requirements, based on evaluation of comprehensive tests performed by manufacturer and witnessed by a qualified testing agency, for door hardware on doors located in accessible routes.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of door hardware to include in maintenance manuals. Include final hardware and keying schedule.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of door hardware from a single manufacturer.
- B. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
- C. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
- D. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines
 1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).

- E. Keying Conference: Conduct conference at Project site. Conference should include Owner, Contractor, and Architect. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
 - 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
 - 2. Preliminary key system schematic diagram.
 - 3. Requirements for key control system.
 - 4. Requirements for access control.
 - 5. Address for delivery of keys.

- F. Preinstallation Conference: Conduct conference at Project site
 - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
 - 2. Inspect and discuss preparatory work performed by other trades.
 - 3. Inspect and discuss electrical roughing-in for electrified door hardware.
 - 4. Review sequence of operation for each type of electrified door hardware.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.

- B. Tag each item or package separately with identification coordinated with the final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package.

1.8 COORDINATION

- A. Installation Templates: Distribute for doors, frames, and other work specified to be factory prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

- B. Existing Openings: Where hardware components are scheduled for application to existing construction or where modifications to existing door hardware are required, field verify existing conditions and coordinate installation of door hardware to suit opening conditions and to provide proper door operation.

1.9 WARRANTY

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware which fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:

- a. Structural failures including excessive deflection, cracking, or breakage.
 - b. Faulty operation of doors and door hardware.
 - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
2. Warranty Period: Manufacturer's standard warranty period shall not be less than required elsewhere in the Contract Documents for the Project.

1.10 MAINTENANCE SERVICE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of door hardware Installer. Provide parts and supplies that are the same as those used in the manufacture and installation of original products.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

- A. Provide door hardware for each door as scheduled on Drawings to comply with requirements in this Section.
 1. Door Hardware Sets: Provide quantity, item, size, finish or color indicated, and products equivalent in function and comparable in quality to named products
 2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

2.2 HINGES

- A. Hinges: BHMA A156.1.
 1. 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:
 - a. Baldwin Hardware Corporation.
 - b. Bommer Industries, Inc.
 - c. Cal-Royal Products, Inc.
 - d. Hager Companies.
 - e. IVES Hardware; an Ingersoll-Rand company.
 - f. Lawrence Hardware Inc.
 - g. McKinney Products Company; an ASSA ABLOY Group company.
 - h. PBB, Inc.
 - i. Stanley Commercial Hardware; Div. of The Stanley Works.

2.3 MECHANICAL LOCKS AND LATCHES

- A. Lock Functions: As indicated in door hardware schedule.
- B. Lock Throw: Comply with testing requirements for length of bolts required for labeled fire doors, and as follows:
 - 1. Bored Locks: Minimum 1/2-inch (13-mm) latchbolt throw.
 - 2. Mortise Locks: Minimum 3/4-inch (19-mm) latchbolt throw.
 - 3. Deadbolts: Minimum 1-inch (25-mm) bolt throw.
- C. Lock Backset: 2-3/4 inches (70 mm), unless otherwise indicated.
- D. Lock Trim:
 - 1. Description: As indicated on Drawings
 - 2. Levers: Wrought, Forged or Cast.
 - 3. Knobs: Wrought, Forged or Cast.
 - 4. Dummy Trim: Match lever lock trim and escutcheons.
 - 5. Operating Device: Lever.
- E. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.
- F. Bored Locks: BHMA A156.2; Grade [1] [2]; Series 4000.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Arrow USA; an ASSA ABLOY Group company.
 - b. Best Access Systems; Div. of Stanley Security Solutions, Inc.
 - c. Cal-Royal Products, Inc.
 - d. Corbin Russwin Architectural Hardware; n ASSA ABLOY Group Company.
 - e. Falcon Lock; An Ingersoll-Rand Company.
 - f. K2 Commercial Hardware; a Black & Decker Corp. company.
 - g. Marks USA.
 - h. Medeco Security Locks, Inc.; an ASSA ABLOY Group company.
 - i. PDO Manufacturing.
 - j. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - k. Schlage Commercial Lock Division; an Ingersoll-Rand company.
 - l. Weiser Lock Corp.; a Black & Decker Corp. company.
 - m. Yale Security Inc.; an ASSA ABLOY Group company.
- G. Mortise Locks: BHMA A156.13; Security Grade; stamped steel case with steel or brass parts; Series 1000.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. Accurate Lock & Hardware Co.
 - b. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
 - c. Arrow USA; an ASSA ABLOY Group company.
 - d. Best Access Systems; Div. of Stanley Security Solutions, Inc.
 - e. Cal-Royal Products, Inc.
 - f. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - g. Falcon Lock; an Ingersoll-Rand company.
 - h. Marks USA.
 - i. PDO Manufacturing.
 - j. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - k. Schlage Commercial Lock Division; an Ingersoll-Rand company.
 - l. Yale Security Inc.; an ASSA ABLOY Group company.
 - m. <Insert manufacturer's name>.
- H. Push-Pull Latches: Bored, BHMA A156.2; Series 4000 with paddle handles that retract latchbolt; capable of being mounted vertically or horizontally.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
 - b. Architectural Builders Hardware Mfg., Inc.
 - c. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - d. Don-Jo Mfg., Inc.
 - e. Glynn-Johnson; an Ingersoll-Rand company.
 - f. IVES Hardware; an Ingersoll-Rand company.
 - g. Rockwood Manufacturing Company.
 - h. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - i. Trimco.

2.4 MANUAL FLUSH BOLTS

- A. Manual Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
- a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
 - b. Burns Manufacturing Incorporated.
 - c. Don-Jo Mfg., Inc.
 - d. Door Controls International, Inc.
 - e. Hiawatha, Inc.
 - f. IVES Hardware; an Ingersoll-Rand company.
 - g. Trimco.

2.5 AUTOMATIC AND SELF-LATCHING FLUSH BOLTS

- A. Automatic and Self-Latching Flush Bolts: BHMA A156.16; minimum 3/4-inch (19-mm) throw; designed for mortising into door edge.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Cal-Royal Products, Inc.
 - b. Door Controls International, Inc.
 - c. IVES Hardware; an Ingersoll-Rand company.
 - d. Trimco.

2.6 EXIT DEVICES AND AUXILIARY ITEMS

- A. Exit Devices and Auxiliary Items: BHMA A156.3.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Adams Rite Manufacturing Co.; an ASSA ABLOY Group company.
 - b. Arrow USA; an ASSA ABLOY Group company.
 - c. Cal-Royal Products, Inc.
 - d. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - e. Detex Corporation.
 - f. Door Controls International, Inc.
 - g. DORMA Architectural Hardware; Member of The DORMA Group North America.
 - h. Dor-O-Matic; an Ingersoll-Rand company.
 - i. K2 Commercial Hardware; a Black & Decker Corp. company.
 - j. Monarch Exit Devices & Panic Hardware; an Ingersoll-Rand company.
 - k. Precision Hardware, Inc.; Division of Stanley Security Solutions, Inc.
 - l. Rutherford Controls Int'l. Corp.
 - m. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - n. Von Duprin; an Ingersoll-Rand company.
 - o. Yale Security Inc.; an ASSA ABLOY Group company.

2.7 LOCK CYLINDERS

- A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
 - 1. Manufacturer: Same manufacturer as for locking devices.
- B. High-Security Lock Cylinders: BHMA A156.30 permanent cores that are removable; face finished to match lockset.

2.8 KEYING

- A. Keying System: Factory registered, complying with guidelines in BHMA A156.28, Appendix A. Incorporate decisions made in keying conference.
 - 1. Existing System:
 - a. Master key or grand master key locks to Owner's existing system.
 - 2. Keyed Alike: Key all cylinders to same change key.
- B. Keys:
 - 1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
 - a. Notation: Information to be furnished by Owner.

2.9 SURFACE CLOSERS

- A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Arrow USA; an ASSA ABLOY Group company.
 - b. Corbin Russwin Architectural Hardware; an ASSA ABLOY Group company.
 - c. DORMA Architectural Hardware; Member of The DORMA Group North America.
 - d. Dor-O-Matic; an Ingersoll-Rand company.
 - e. K2 Commercial Hardware; a Black & Decker Corp. company.
 - f. LCN Closers; an Ingersoll-Rand company.
 - g. Norton Door Controls; an ASSA ABLOY Group company.
 - h. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
 - i. SARGENT Manufacturing Company; an ASSA ABLOY Group company.
 - j. Yale Security Inc.; an ASSA ABLOY Group company.

2.10 CONCEALED CLOSERS

- A. Concealed Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. DORMA Architectural Hardware; Member of The DORMA Group North America.
 - b. LCN Closers; an Ingersoll-Rand company.
 - c. Norton Door Controls; an ASSA ABLOY Group company.
 - d. Rixson Specialty Door Controls; an ASSA ABLOY Group company.
 - e. SARGENT Manufacturing Company; an ASSA ABLOY Group company.

2.11 DOOR GASKETING

- A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Hager Companies.
 - b. M-D Building Products, Inc.
 - c. National Guard Products.
 - d. Pemko Manufacturing Co.; an ASSA ABLOY Group company.
 - e. Reese Enterprises, Inc.
 - f. Sealeze; a unit of Jason Incorporated.
 - g. Zero International.

2.12 METAL PROTECTIVE TRIM UNITS

- A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch- (1.3-mm-) thick aluminum or stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Baldwin Hardware Corporation.
 - b. Burns Manufacturing Incorporated.
 - c. Don-Jo Mfg., Inc.
 - d. Hiawatha, Inc.
 - e. IPC Door and Wall Protection Systems, Inc.; Div. of InPro Corporation.
 - f. IVES Hardware; an Ingersoll-Rand company.
 - g. Pawling Corporation.
 - h. Rockwood Manufacturing Company.
 - i. Trimco.

2.13 FABRICATION

- A. Base Metals: Produce door hardware units of base metal indicated, fabricated by forming method indicated, using manufacturer's standard metal alloy, composition, temper, and hardness. Furnish metals of a quality equal to or greater than that of specified door hardware units and BHMA A156.18.
- B. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
 - 1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
 - 2. Spacers or Sex Bolts: For through bolting of hollow-metal doors.
 - 3. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."
 - 4. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.14 FINISHES

- A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance.

- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
- B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."

3.3 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
 - 1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
 - 2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing. Do not install surface-mounted items until finishes have been completed on substrates involved.
 - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
 - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.
- E. Boxed Power Supplies: location with Architect.
 - 1. Configuration: Provide least number of power supplies required to adequately serve doors with electrified door hardware.
- F. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they will impede traffic.

- G. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.
- H. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

3.4 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
 - 1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

3.5 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure that door hardware is without damage or deterioration at time of Substantial Completion.

3.6 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Section 017900 "Demonstration and Training."

3.7 DOOR HARDWARE SCHEDULE

END OF SECTION 087100

SECTION 087113 - AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes **low-energy** door operators for swinging doors.

1.2 DEFINITIONS

- A. AAADM: American Association of Automatic Door Manufacturers.
- B. Double-Egress (Doors): A pair of doors that simultaneously swing with the two doors moving in opposite directions with no mullion between them.
- C. Dual-Swing (Doors): A pair of doors that swing with the two doors moving in opposite directions with a mullion between them; each door functioning as a single-swing door.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at **[Project site] <Insert location>**.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For automatic door operators.
 - 1. Include plans, elevations, sections, hardware mounting heights, and attachment details.
 - 2. Include diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified.

1.5 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Field quality-control reports.
- C. Sample warranties.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and certified by manufacturer for installation and maintenance of units required for this Project.

1.8 WARRANTY

- A. Warranty: Manufacturer agrees to repair or replace components of automatic door operators that fail in materials or workmanship within standard one year warranty period.
 - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide NABCO ENTRANCES, INC.; Nabco/Gyro Tech, **GT8500** or comparable product by one of the following:
 - 1. Besam Entrance Solutions; Subsidiary of ASSA ABLOY Entrance Systems, **SW200i**.
 - 2. Horton Automatics; a division of Overhead Door Corporation, **4100LE**.
 - 3. LCN Closers; an Ingersoll-Rand company, **9540**.
 - 4. Stanley Access Technologies, LLC; Div. of Stanley Security Solutions, **Magic-Swing**.

2.2 AUTOMATIC DOOR OPERATORS, GENERAL

- A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated; and according to UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.
- B. Electromechanical Operating System: Self-contained unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation- and safety-device wiring, and manual operation including spring closing when power is off.
- C. Cover for Surface-Mounted Operators: Fabricated from **0.125-inch- (3.2-mm-)** thick, extruded or formed aluminum; **manufacturer's standard width**; with enclosed end caps, provision for **side load** access.
- D. Brackets and Reinforcements: Fabricated from aluminum with nonstaining, nonferrous shims for aligning system components.
- E. Electrical Components, Devices, and Accessories: Listed and labeled, by a qualified testing agency, and marked for intended location and application.

2.3 LOW-ENERGY DOOR OPERATORS

- A. Standard: BHMA A156.19.

B. Performance Requirements:

1. Opening Force if Power Fails: Not more than **15 lbf (67 N)** required to release a latch if provided, not more than **30 lbf (133 N)** required to manually set door in motion, and not more than **15 lbf (67 N)** required to fully open door.
2. Entrapment-Prevention Force: Not more than **15 lbf (67 N)** required to prevent stopped door from closing or opening.

C. Configuration: Operator to control single swinging door.

1. Traffic Pattern: **One** way.
2. Operator Mounting: **Surface**.

D. Operation: Power opening and spring closing with dynamic and hydraulic breaking. When not in automatic mode, door operator shall function as manual door closer, with or without electrical power.

E. Operating System: **Electromechanical**.

F. Magnum Control Unit: Solid-state controller.

G. Features:

1. Adjustable **opening and closing** speed.
2. Adjustable opening force.
3. Adjustable backcheck.
4. Adjustable hold-open time from zero to 30 seconds.
5. Opening obstruction detection.
6. On-off/hold-open rocker switch or key switch to control operator functions; **key operated**.
7. "Push and Go" Feature.

H. Activation Device: **Push-plate switch on each side of door** to activate door operator.

I. Exposed Finish: **Class I, clear anodic finish**.

2.4 MATERIALS

A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Extrusions: **ASTM B 221 (ASTM B 221M)**.
2. Sheet: **ASTM B 209 (ASTM B 209M)**.

B. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

2.5 CONTROLS

A. General: Provide controls according to BHMA standards for condition of exposure and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated. Coordinate devices with door operation and door operator mechanisms.

- B. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator **with contrasting-colored, engraved message.**
 - 1. Configuration: **Square** push plate with **4-by-4-inch (100-by-100-mm)** junction box.
 - a. Mounting: **As indicated on Drawings.**
 - 2. Push-Plate Material: **Stainless steel** as selected by Architect from manufacturer's full range.
 - 3. Message: **International symbol of accessibility.**
- C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

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2.6 FABRICATION

- A. Factory fabricate automatic door operators to comply with indicated standards.
- B. Fabricate exterior components to drain condensation and water passing joints within operator enclosure to the exterior.
- C. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match operator.

2.7 ACCESSORIES

- A. Signage: As required by cited BHMA standard for type of door and its operation.
 - 1. Application Process: **Operator manufacturer's standard process.**
 - 2. Provide sign materials with instructions for field application when operators are installed.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install automatic door operators according to manufacturer's written instructions and cited BHMA standard for type of door operation and direction of pedestrian travel, including signage, controls, wiring, remote power units if any, and connection to building's power supply.
- B. Controls: Install devices according to manufacturer's written instructions and cited BHMA standard for operator type and direction of pedestrian travel.
- C. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.
- D. Adjusting: Adjust automatic door operators to function smoothly and for weathertight closure, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.

1. Readjust automatic door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).

E. Demonstration: Engage factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain automatic door operators.

3.2 FIELD QUALITY CONTROL

A. Perform the following tests and inspections **with the assistance of a factory-authorized service representative**:

1. Test and inspect each automatic door operator installation, using AAADM inspection forms, to determine compliance of installed systems with applicable BHMA standards.

B. Prepare test and inspection reports.

END OF SECTION 087113

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes:
 - 1. Glass for windows.
 - 2. Glazing sealants and accessories.

1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. IBC: International Building Code.
- D. Interspace: Space between lites of an insulating-glass unit.

1.4 ACTION SUBMITTALS

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

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For glass.
- B. Product Test Reports: For insulating glass and glazing sealants, for tests performed by a qualified testing agency.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

- B. Comply with insulating-glass manufacturer's written instructions for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or are below 40 deg F (4.4 deg C).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations for Glass: Obtain from single source from single manufacturer for each glass type.
- B. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design glazing.
- C. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the IBC and ASTM E 1300.
 - 1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
 - a. Basic Wind Speed: 90 mph (40 m/s).
 - b. Importance Factor: 1.0.
 - c. Exposure Category: B.
- D. Safety Glazing: Where required by the governing building code, provide glazing that complies with 16 CFR 1201, Category II.

- E. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
 2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
 3. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
 4. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
 5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.3 GLASS PRODUCTS, GENERAL

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
1. GANA Publications: "Glazing Manual."
 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR A7, "Sloped Glazing Guidelines."
 3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
 4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."
- B. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- C. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.
- D. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.
1. Minimum Glass Thickness for Exterior Lites: 6 mm.
 2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- E. Strength: Where annealed float glass is indicated, provide annealed float glass, heat-strengthened float glass, or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened float glass is indicated, provide heat-strengthened float glass or fully tempered float glass as needed to comply with "Performance Requirements" Article. Where fully tempered float glass is indicated, provide fully tempered float glass.

2.4 GLASS PRODUCTS

- A. Clear Annealed Float Glass: ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.
- B. Fully Tempered Float Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear), Quality-Q3.
 - 1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.

2.5 INSULATING GLASS

- A. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
 - 1. Sealing System: Dual seal, with manufacturer's standard primary and secondary sealants.
 - 2. Spacer: Manufacturer's standard spacer material and construction.
 - 3. Desiccant: Molecular sieve or silica gel, or a blend of both.

2.6 GLAZING SEALANTS

- A. General:
 - 1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Sealants shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services) "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
 - 4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

2.7 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape, where indicated.
 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
 2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, with requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

2.9 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
1. Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

- C. Grind smooth and polish exposed glass edges and corners.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep systems.
 - 3. Minimum required face and edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that leave visible marks in the completed Work.

3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.
- C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- H. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- I. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.
- 3.4 SEALANT GLAZING (WET)
- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.
- 3.5 CLEANING AND PROTECTION
- A. Immediately after installation remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass

manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

- C. Remove and replace glass that is damaged during construction period.
- D. Wash glass on both exposed surfaces not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

3.6 INSULATING GLASS SCHEDULE

- A. Glass Type: Low-E-coated, clear insulating glass.
 - 1. Overall Unit Thickness: 5/8 inch (16 mm).
 - 2. Minimum Thickness of Each Glass Lite: As required for code compliance.
 - 3. Outdoor Lite: Float glass, fully tempered where required for code compliance.
 - 4. Interspace Content: Argon.
 - 5. Indoor Lite: Float glass, fully tempered where required for code compliance.
 - 6. Low-E Coating: Sputtered on third surface.
 - 7. Safety glazing where required for code compliance.

END OF SECTION 088000

SECTION 090310 - CLEANING DISCOLORED OR STAINED WALL COVERING

PART 1---GENERAL

1.01 SUMMARY

A. This procedure includes guidance on cleaning stained or discolored wall covering. Most wall coverings are classified as either "non-washable", "washable", or "scrubbable". General procedures for each type are included below under Execution.

B. See 013591 for general project guidelines to be reviewed along with this procedure. These guidelines should be reviewed prior to performing this procedure and should be followed, when applicable, along with recommendations from the Kansas Historic Preservation Officer (KHPO).

PART 2---PRODUCTS

2.01 MANUFACTURERS

- A. Absorene Manufacturing Co.
1609 North 14th St.
St. Louis, MO 63106
314/231-6355

2.02 MATERIALS

- A. Paste Spot Remover (available in local hardware store, home improvement centers, or paint/wallpaper stores)
- B. Commercial wallpaper cleaner such as "Absorene" - a doughy wall cleaner (Absorene Manufacturing Co.)
- C. Erasers, such as powdered draftsman's pad or Opaline pads, or hard vinyls like Staedtler or Art Gum.
- D. Denatured Alcohol:
 - 1. Other chemical or common names include Methylated spirit*.
 - 2. Potential hazards: TOXIC AND FLAMMABLE.
 - 3. Available from hardware store, paint store or printer's supply distributor.
 - 4. Denatured alcohol should be a satisfactory substitute for ethyl alcohol for stain removing purposes.
- E. Mild dish-washing detergent
- F. Household Bleach:
 - 1. An unstable salt produced usually in aqueous

solution and used as a bleaching and disinfecting agent.

2. Other chemical or common names include Bleaching solution*; Laundry bleach*; Sodium Hypochlorite (NaOCl); Solution of chlorinated soda*.
3. Potential Hazards: CORROSIVE TO FLESH.
4. Available from chemical supply house, grocery store or supermarket, hardware store or janitorial supply distributor.

G. Blotter/paper towels

2.03 EQUIPMENT

- A. Sponges
- B. Putty knife
- C. Iron
- D. Buckets
- E. Clean, soft cloths or towels
- F. Soft-bristle brush
- G. Vacuum

PART 3---EXECUTION

3.01 ERECTION, INSTALLATION, APPLICATION

NOTE: ALWAYS TEST CLEANING METHODS IN AN INCONSPICUOUS LOCATION TO DETERMINE THE SAFEST AND MOST SUITABLE METHOD.

- A. For Washable Coverings: These usually have a plastic coating.
 1. Wash the surface using a damp sponge and a mild dishwashing detergent mixed in cool water; wipe the surface from the bottom up; wipe using a circular motion in overlapping strokes.
 2. Pat the surface dry using a soft cloth or towel.
 3. If a second washing is necessary, allow the wall to completely dry before beginning the cleaning sequence again.
- B. For Scrubbable Coverings (usually vinyl or vinyl- impregnated paper):
 1. Scrub the surface using a sponge or soft cloth and a foam cleanser or all-purpose detergent.
 2. Rinse the cleaner from the surface using a clean, damp sponge.
 3. Pat the surface dry using a soft cloth or towel.
- C. For Fabric Coverings (such as burlap or grass cloth):
 1. Remove loose dirt using a clean cloth or vacuum.

2. Spot clean only using a sponge or soft-bristle brush and a mild detergent. For stubborn spots, try adding 2-3 tablespoons of bleach to the solution.
3. Rinse the area thoroughly with a clean, damp sponge or soft cloth and water.
4. Pat the surface dry using a soft cloth or towel.

D. For Non-washable Coverings: Clean using a commercial wallpaper cleaner. Follow manufacturer's instructions.

E. For Stain Removal:

1. For Fingerprints, Smudges, and Pencil Marks:

- a. Rub gently with art gum (or other eraser-type material, or use commercial wallpaper cleaner, following manufacturer's instructions.
- b. If paper is washable, marks may be removed using a damp sponge and a solution of mild dishwashing detergent and cool water.

2. For Grease Spots:

- a. Set blotter or paper towels over stain and press with a warm iron. Grease should be loosened and absorbed by the towels.
- b. If stain still remains, apply a paste spot remover and allow to dry; brush off powder from the surface.
- c. For washable wallpaper, wipe off grease using a sudsy sponge, followed by damp sponge.

3. For Crayon Marks:

- a. Scrape off excess crayon using a putty knife.
- b. Set blotter or paper towels over stain and press with a warm iron. Crayon should be loosened and absorbed by the towels.
- c. For non-washable papers, apply a paste spot remover and allow to dry.

-or-

Gently wipe the stained area with denatured alcohol or spot remover. Use a clean, soft cloth to apply the solvent.

NOTE: THESE SOLVENTS ARE FLAMMABLE AND VAPORS ARE TOXIC, SO BE SURE THERE IS NO FLAME, SPARK, OR PILOT LIGHT IN AREA, HAVE PLENTY OF VENTILATION. USE ONLY ON SMALL SPOTS.

- d. For washable papers, wipe off crayon using a sudsy sponge followed by a damp sponge and allow to dry. Try not to smear the residue.

END OF SECTION

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.
- B. **Buy America:** Steel products in this section are subject to Buy America coverage.

1.2 SUMMARY

- A. This Section includes non-load-bearing steel framing members for the following applications:
 - 1. Interior framing systems (e.g., supports for partition walls, framed soffits, furring, etc.).

1.3 SUBMITTALS

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

PART 2 - PRODUCTS

2.1 NON-LOAD-BEARING STEEL FRAMING, GENERAL

- A. **Buy America:** Steel products in this section are subject to Buy America coverage.
- B. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
 - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal, unless otherwise indicated.
 - 2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized, unless otherwise indicated.

2.2 STEEL FRAMING FOR FRAMED ASSEMBLIES

- A. **Buy America:** Steel products in this section are subject to Buy America coverage.
- B. Steel Studs and Runners: ASTM C 645.
 - 1. Minimum Base-Metal Thickness: 0.0283 inch for 12' tall walls, 0.0188 inch for 9' tall walls.
 - 2. Depth: 3-5/8 inches (92.1 mm).

- C. Slip-Type Head Joints: Where indicated, provide one of the following:
 - 1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (50.8-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
- D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
 - 1. Minimum Base-Metal Thickness: 0.0179 inch (0.45 mm).

2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards.
 - 1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance.
 - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.3 INSTALLATION, GENERAL

- A. Installation Standard: ASTM C 754, except comply with framing sizes and spacing indicated.
 - 1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
- C. Install bracing at terminations in assemblies.
- D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

- A. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- B. Install studs so flanges within framing system point in same direction.
 - 1. Space studs as follows:
 - a. Single-Layer Application: 16 inches (406 mm) o.c., unless otherwise indicated.
 - b. Multilayer Application: 16 inches (406 mm) o.c., unless otherwise indicated.
 - c. Tile backing panels: 16 inches (406 mm) o.c., unless otherwise indicated.
- C. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings, except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
 - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
 - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
 - a. Install two studs at each jamb, unless otherwise indicated.
 - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (12.7-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
 - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
 - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings, unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
- D. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

END OF SECTION 092216

SECTION 092400 - CEMENT PLASTERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract..

1.2 SUMMARY

- A. Section Includes:
 - 1. Interior portland cement plasterwork on metal lath and unit masonry.
 - 2. Exterior portland cement plasterwork (stucco) on metal lath.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of factory-prepared finish coat indicated.

1.4 QUALITY ASSURANCE

- A. Mockups: Before plastering, install mockups of at least 100 sq. ft. (9.3 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Install mockups for each type of finish indicated.
 - 2. For interior plasterwork, simulate finished lighting conditions for review of mockups.
 - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- B. Preinstallation Conference: Conduct conference at Project site.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes.

1.6 PROJECT CONDITIONS

- A. Comply with ASTM C 926 requirements.

- B. Interior Plasterwork: Maintain room temperatures at greater than 40 deg F (4.4 deg C) for at least 48 hours before plaster application, and continuously during and after application.
 - 1. Avoid conditions that result in plaster drying out during curing period. Distribute heat evenly; prevent concentrated or uneven heat on plaster.
 - 2. Ventilate building spaces as required to remove water in excess of that required for hydrating plaster in a manner that prevents drafts of air from contacting surfaces during plaster application and until plaster is dry.

- C. Exterior Plasterwork:
 - 1. Apply and cure plaster to prevent plaster drying out during curing period. Use procedures required by climatic conditions, including moist curing, providing coverings, and providing barriers to deflect sunlight and wind.
 - 2. Apply plaster when ambient temperature is greater than 40 deg F (4.4 deg C).
 - 3. Protect plaster coats from freezing for not less than 48 hours after set of plaster coat has occurred.

PART 2 - PRODUCTS

2.1 METAL LATH

- A. **Buy America:** Products in this section are subject to Buy America coverage.
- B. Expanded-Metal Lath: ASTM C 847 with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
 - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
 - b. CEMCO.
 - c. Clark Western Building Systems.
 - d. Dietrich Metal Framing; a Worthington Industries company.
 - e. MarinoWARE.
 - f. Phillips Manufacturing Co.
 - 2. Diamond-Mesh Lath: Flat or Self-furring

2.2 ACCESSORIES

- A. **Buy America:** Products in this section are subject to Buy America coverage.
- B. General: Comply with ASTM C 1063 and coordinate depth of trim and accessories with thicknesses and number of plaster coats required.
- C. Metal Accessories:

1. Manufacturers: Subject to compliance with requirements, [available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Alabama Metal Industries Corporation; a Gibraltar Industries company.
 - b. CEMCO.
 - c. Clark Western Building Systems.
 - d. Dietrich Metal Framing; a Worthington Industries company.
 - e. MarinoWARE.
 - f. Phillips Manufacturing Co.
2. Cornerite: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
3. External-Corner Reinforcement: Fabricated from metal lath with ASTM A 653/A 653M, G60 (Z180), hot-dip galvanized zinc coating.
4. Cornerbeads: Fabricated from zinc or zinc-coated (galvanized) steel.
5. Casing Beads: Fabricated from zinc or zinc-coated (galvanized) steel; square-edged style; with expanded flanges.
6. Control Joints: Fabricated from zinc or zinc-coated (galvanized) steel; one-piece-type, folded pair of unperforated screeds in M-shaped configuration; with perforated flanges and removable protective tape on plaster face of control joint.
7. Expansion Joints: Fabricated from zinc or zinc-coated (galvanized) steel; folded pair of unperforated screeds in M-shaped configuration; with expanded flanges.

2.3 MISCELLANEOUS MATERIALS

- A. Water for Mixing: Potable and free of substances capable of affecting plaster set or of damaging plaster, lath, or accessories.
- B. Fiber for Base Coat: Alkaline-resistant glass or polypropylene fibers, 1/2 inch (13 mm) long, free of contaminants, manufactured for use in portland cement plaster.
- C. Bonding Compound: ASTM C 932.
- D. Steel Drill Screws: For metal-to-metal fastening, ASTM C 1002 or ASTM C 954, as required by thickness of metal being fastened; with pan head that is suitable for application; in lengths required to achieve penetration through joined materials of no fewer than three exposed threads.
- E. Fasteners for Attaching Metal Lath to Substrates: Complying with ASTM C 1063.
- F. Acrylic-Based Finish Coatings: Factory-mixed acrylic-emulsion coating systems, formulated with colorfast mineral pigments and fine aggregates; for use over portland cement plaster base coats. Include manufacturer's recommended primers and sealing topcoats for acrylic-based finishes.
 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Acrocrete, BASF Wall Systems, Inc.; Acrotex.

- b. California Stucco Products Corp.; Texture Flex.
- c. Dryvit Systems, Inc.; Dryvit TAFS.
- d. El Rey Stucco Company, Inc., a brand of ParexLaHabra, Inc.; Prema-Flex.
- e. Finestone, BASF Wall Systems, Inc.; PebbleTex.
- f. LaHabra, a brand of ParexLaHabra, Inc.; Acrylic Finish.
- g. Master Wall Inc.; Superior Finishes.
- h. Omega Products International, Inc.; Omega Flex Finishes.
- i. Parex, Inc., a brand of ParexLaHabra, Inc.; e-elastic.
- j. Pleko Group LLC Products, Inc.; Pleko Structure Finishes.
- k. Senergy, BASF Wall Systems, Inc.; Senerflex.
- l. Shamrock Stucco LLC; Stucco Acrylic Finish.
- m. Sto Corp.; Powerwall Finish.
- n. Stuc-O-Flex International, Inc.; Elastomeric Finish
- o. Surewall, a brand of ParexLaHabra, Inc.; Acrylic Finish.
- p. SonoWall, BASF Wall Systems, Inc.; StuccoTex Finish.

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

2.4 PLASTER MIXES

- A. General: Comply with ASTM C 926 for applications indicated.
 1. Fiber Content: Add fiber to base-coat mixes after ingredients have mixed at least two minutes. Comply with fiber manufacturer's written instructions for fiber quantities in mixes, but do not exceed 1 lb of fiber/cu. yd. (0.6 kg of fiber/cu. m) of cementitious materials.
- B. Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork as follows:
 1. Portland Cement Mixes:
 - a. Scratch Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 or 3/4 to 1-1/2 parts lime. Use 2-1/2 to 4 parts aggregate per part of cementitious material.
 - b. Brown Coat: For cementitious material, mix 1 part portland cement and 0 to 3/4 or 3/4 to 1-1/2 parts lime. Use 3 to 5 parts aggregate per part of cementitious material, but not less than volume of aggregate used in scratch coat.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Protect adjacent work from soiling, spattering, moisture deterioration, and other harmful effects caused by plastering.
- B. Prepare solid substrates for plaster that are smooth or that do not have the suction capability required to bond with plaster according to ASTM C 926.

3.3 INSTALLING METAL LATH

- A. Expanded-Metal Lath: Install according to ASTM C 1063.
 - 1. Partition Framing and Vertical Furring: Install flat diamond-mesh lath.
 - 2. On Solid Surfaces, Not Otherwise Furred: Install self-furring, diamond-mesh lath.

3.4 INSTALLING ACCESSORIES

- A. Install according to ASTM C 1063 and at locations indicated on Drawings.
- B. Reinforcement for External Corners:
 - 1. Install lath-type, external-corner reinforcement at exterior locations.
 - 2. Install cornerbead at interior locations.
- C. Control Joints: Install control joints in specific locations approved by Architect for visual effect as follows:
 - 1. As required to delineate plasterwork into areas (panels) of the following maximum sizes:
 - a. Vertical Surfaces: 144 sq. ft. (13.4 sq. m).
 - 2. At distances between control joints of not greater than 18 feet (5.5 m) o.c.
 - 3. As required to delineate plasterwork into areas (panels) with length-to-width ratios of not greater than 2-1/2:1.
 - 4. Where control joints occur in surface of construction directly behind plaster.
 - 5. Where plasterwork areas change dimensions, to delineate rectangular-shaped areas (panels) and to relieve the stress that occurs at the corner formed by the dimension change.

3.5 PLASTER APPLICATION

- A. General: Comply with ASTM C 926.
 - 1. Do not deviate more than plus or minus 1/4 inch in 10 feet (6.4 mm in 3 m) from a true plane in finished plaster surfaces, as measured by a 10-foot (3-m) straightedge placed on surface.

2. Finish plaster flush with metal frames and other built-in metal items or accessories that act as a plaster ground unless otherwise indicated. Where casing bead does not terminate plaster at metal frame, cut base coat free from metal frame before plaster sets and groove finish coat at junctures with metal.
 3. Provide plaster surfaces that are ready to receive field-applied finishes indicated.
- B. Bonding Compound: Apply on unit masonry plaster bases.
- C. Walls; Base-Coat Mixes for Use over Metal Lath: Scratch and brown coats for three-coat plasterwork, on masonry; 3/4-inch (19-mm) thickness.
1. Portland cement mixes.
- D. Acrylic-Based Finish Coatings: Apply coating system, including primers, finish coats, and sealing topcoats, according to manufacturer's written instructions.
- E. Concealed Interior Plasterwork:
1. Where plaster application will be concealed behind built-in cabinets, similar furnishings, and equipment, apply finish coat.
 2. Where plaster application will be concealed above suspended ceilings and in similar locations, finish coat may be omitted.
- 3.6 PLASTER REPAIRS
- A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.
- 3.7 PROTECTION
- A. Remove temporary protection and enclosure of other work. Promptly remove plaster from door frames, windows, and other surfaces not indicated to be plastered. Repair floors, walls, and other surfaces stained, marred, or otherwise damaged during plastering.

END OF SECTION 092400

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. This Section includes the following:
 - 1. Interior gypsum board.

1.3 SUBMITTALS

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

1.4 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PANELS, GENERAL

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

2.2 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

- a. American Gypsum Co.
- b. BPB America Inc.
- c. G-P Gypsum.
- d. Lafarge North America Inc.
- e. National Gypsum Company.
- f. PABCO Gypsum.
- g. Temple.
- h. USG Corporation.

- B. Regular Type:

1. Thickness: 1/2 inch (12.7 mm).
2. Long Edges: Tapered.

- C. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.

1. Core: 5/8 inch (15.9 mm), Type X.
2. Long Edges: Tapered.
 - a. PABCO Gypsum.
 - b. Temple.
 - c. USG Corporation.

2.3 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.

1. Material: Galvanized or aluminum-coated steel sheet, or rolled zinc.
2. Shapes:
 - a. Cornerbead.
 - b. Bullnose bead.
 - c. LC-Bead: J-shaped; exposed long flange receives joint compound.

- d. L-Bead: L-shaped; exposed long flange receives joint compound.
- e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
- f. Expansion (control) joint.
- g. Curved-Edge Cornerbead: With notched or flexible flanges.

2.4 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
 1. Interior Gypsum Wallboard: Paper.
 2. Tile Backing Panels: As recommended by panel manufacturer.
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
 1. Prefilling: At open joints, beveled panel edges, and damaged surface areas, use setting-type taping compound.
 2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
 - a. Use setting-type compound for installing paper-faced metal trim accessories.
 3. Fill Coat: For second coat, use drying-type, all-purpose compound.
 4. Finish Coat: For third coat, use drying-type, all-purpose compound.
 5. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound or high-build interior coating product designed for application by airless sprayer and to be used instead of skim coat to produce Level 5 finish.

2.5 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
- C. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
 1. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch (0.84 to 2.84 mm) thick.

2.6 TEXTURE FINISHES

- A. Primer: As recommended by textured finish manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840.
- B. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- C. Locate edge and end joints over supports. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- D. Form control and expansion joints with space between edges of adjoining gypsum panels.
- E. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
 - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
 - 2. Fit gypsum panels around ducts, pipes, and conduits.
 - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- F. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
 - 1. Regular Type: Vertical surfaces over OSB sheathing, CMU, or Z-furring with rigid insulation, unless otherwise indicated.
 - 2. Moisture- and Mold-Resistant Type: Vertical surfaces as backer for tile.

B. Single-Layer Application:

1. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
 - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
2. Fastening Methods: Apply gypsum panels to supports with steel drill screws.

3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
 1. Cornerbead: Use at outside corners.
 2. LC-Bead: Use at exposed panel edges.
 3. Curved-Edge Cornerbead: Use at curved openings.

3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints, beveled edges, and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and to ASTM C 840:
 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
 2. Level 2: Panels that are substrate for tile.
 3. Level 4: At panel surfaces to be exposed to view, unless otherwise indicated.
 4. Level 5 is suitable for surfaces receiving gloss and semigloss enamels and other surfaces subject to severe lighting. It is considered a high-quality gypsum board finish.

3.6 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.
 - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
 - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 092900

SECTION 093000 - TILING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:

- 1. Ceramic tile.

1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."
- C. Module Size: Actual tile size plus joint width indicated.
- D. Face Size: Actual tile size, excluding spacer lugs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.
- C. Samples for Verification:
 - 1. Full-size units of each type and composition of tile and for each color and finish required.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Certificates: For each type of product, signed by product manufacturer.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Tile and Trim Units: Furnish quantity of full-size units equal to 3 percent of amount installed for each type, composition, color, pattern, and size indicated.
 - 2. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.

1.7 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile from one source or producer.
 - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from one manufacturer and each aggregate from one source or producer.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected from freezing.
- E. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.

1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL

- A. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
 - 1. Provide tile complying with Standard grade requirements unless otherwise indicated.
- B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCA installation methods specified in tile installation schedules, and other requirements specified.
- C. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.

2.2 TILE PRODUCTS

- A. Tile Type: square-edged ceramic tile.
 - 1. Manufacturers: Subject to compliance with requirements:
 - 2. Face Size: 6 by 6 inches (152 by 152 mm) To match existing
 - 3. Thickness: To match existing
 - 4. Wearing Surface: To match existing
 - 5. Finish: To match existing.
 - 6. Tile Color and Pattern: To match existing.
 - 7. Grout Color: To match existing

2.3 TILE BACKING PANELS (if needed)

- A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, in maximum lengths available to minimize end-to-end butt joints.
 - 1. Products: Subject to compliance with requirements.
 - 2. Thickness: To match existing and install flush with surrounding existing tile.

2.4 SETTING MATERIALS

- A. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.
 - 1. Manufacturers: Subject to compliance with requirements.

2.5 GROUT MATERIALS

- A. Sand-Portland Cement Grout: ANSI A108.10, composed of white or gray cement and white or colored aggregate as required to produce color indicated.
- B. Standard Cement Grout: ANSI A118.6.
 - 1. Manufacturers: Subject to compliance with requirements.

2.6 ELASTOMERIC SEALANTS

- A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with requirements.
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.
- C. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

2.7 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- C. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
- B. Add materials, water, and additives in accurate proportions.

- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
 - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
 - 2. Verify that concrete substrates for tile floors installed with adhesives, bonded mortar bed, or thin-set mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
 - a. Verify that surfaces that received a steel trowel finish have been mechanically scarified.
 - b. Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.
 - 3. Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Architect.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with adhesives or thin-set mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

3.3 TILE INSTALLATION

- A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
 - 1. For the following installations, follow procedures in the ANSI A108 Series of tile installation standards for providing 95 percent mortar coverage:
 - a. Tile floors in wet areas.

- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
- E. Jointing Pattern (To match and fit with existing): Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.
 - 1. Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.
 - 2. Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.
- F. Joint Widths: To match existing.
- G. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

3.4 TILE BACKING PANEL INSTALLATION

- A. Install cementitious backer units and fiber-cement underlayment and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

3.5 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
 - 1. Remove latex portland cement - grout residue from tile as soon as possible.
 - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

3.6 INTERIOR TILE INSTALLATION SCHEDULE

A. Interior Floor Installations, Concrete Subfloor:

- 1. Tile Installation F112: Cement mortar bed (thickset) bonded to concrete; TCA F112 and ANSI A108.1A, ANSI A108.1B, ANSI A108.1C.
 - a. Tile Type: ceramic.
 - b. Thin-Set Mortar for Cured-Bed Method: Dry-set, Latex-, Medium-bed, latex-portland cement mortar.
 - c. Grout: To match existing.
- 2. Tile Installation F113: Thin-set mortar; TCA F113.
 - a. Tile Type: ceramic.
 - b. Thin-Set Mortar: Dry-set, Latex-, Medium-bed, latex-portland cement mortar.
 - c. Grout: To match existing.

END OF SECTION 093000

SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:
 - 1. Acoustical tiles for ceilings.
 - 2. Concealed suspension systems.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified, 6-inches- (150-mm-) in size.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.
 - 2. Suspension-System Components: Quantity of each concealed grid and exposed component equal to 2 percent of quantity installed.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical tiles, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

- B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
 - 1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

PART 2 - PRODUCTS

2.1 ACOUSTICAL TILES, GENERAL

- A. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system from single source from single manufacturer.
- B. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
- C. Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.
 - 1. Where appearance characteristics of acoustical tiles are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.2 ACOUSTICAL TILES

- A. Manufacturers: Subject to compliance with requirements.
- B. Color: As selected from manufacturer's full range.
- C. Edge/Joint Detail: Square, kerfed and rabbeted; tongue and grooved; or butt
- D. Thickness: 5/8 inch (15 mm).
- E. Modular Size: 12 by 12 inches (305 by 305 mm)

2.3 METAL SUSPENSION SYSTEMS, GENERAL

- A. Metal Suspension-System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
- B. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
 - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
 - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.
- C. Hanger Rods or Flat Hangers: Mild steel, zinc coated or protected with rust-inhibitive paint.
- D. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

2.4 METAL SUSPENSION SYSTEM

- A. Manufacturers: Subject to compliance with requirements.
- B. Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z90) coating designation.
 - 1. Structural Classification: Heavy-duty system.
 - 2. Access: Upward, with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.

2.5 METAL EDGE MOLDINGS AND TRIM

- A. Manufacturers: Subject to compliance with requirements.
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.
 - 1. Provide manufacturer's standard edge moldings that fit acoustical tile edge details and suspension systems indicated and that match width and configuration of exposed runners unless otherwise indicated.

2. For circular penetrations of ceiling, provide edge moldings fabricated to diameter required to fit penetration exactly.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Suspend ceiling hangers from building's structural members and as follows:
 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
 4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
 5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are

- secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly from permanent metal forms or floor deck. Fasten hangers to cast-in-place hanger inserts, postinstalled mechanical or adhesive anchors, or power-actuated fasteners that extend through forms into concrete.
 7. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
 8. Do not attach hangers to steel deck tabs.
 9. Do not attach hangers to steel roof deck. Attach hangers to structural members.
 10. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
 11. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.
1. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
 2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
- E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
- F. Arrange directionally patterned acoustical tiles as follows:
1. As indicated on reflected ceiling plans.
 - 2.
- G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.
1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
 2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches (305 mm) o.c.

3.4 CLEANING

- A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

SECTION 096519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:
 - 1. Vinyl composition floor tile.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection: For each type of floor tile indicated.
- C. Samples for Verification: Full-size units of each color and pattern of floor tile required.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
 - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups for floor tile including accessories.
 - a. Size: Minimum 100 sq. ft. (9.3 sq. m) for each type, color, and pattern in locations directed by Architect.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
 - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F (10 deg C) or more than 90 deg F (32 deg C). Store floor tiles on flat surfaces.

1.9 FIELD CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, in spaces to receive floor tile during the following time periods:
 - 1. 48 hours before installation.
 - 2. During installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

PART 2 - PRODUCTS

2.1 VINYL COMPOSITION FLOOR TILE

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. AB; American Biltrite
 - 2. Armstrong World Industries, Inc

3. Congoleum Corporation
4. Mannington Mills, Inc

- B. Wearing Surface: Smooth
- C. Thickness: 0.125 inch (3.2 mm)
- D. Size: 12 by 12 inches (305 by 305 mm).
- E. Colors and Patterns: As selected by Architect from full range of industry colors

2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
 1. Adhesives shall comply with the following limits for VOC content:
 - a. Vinyl Composition Tile Adhesives: 50 g/L or less.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.3 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
1. Lay tiles in pattern indicated.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.

- B. Perform the following operations immediately after completing floor tile installation:
 - 1. Remove adhesive and other blemishes from exposed surfaces.
 - 2. Sweep and vacuum surfaces thoroughly.
 - 3. Damp-mop surfaces to remove marks and soil.

- C. Protect floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

- D. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.

- E. Cover floor tile until Substantial Completion.

END OF SECTION 096519

SECTION 096610 – TERRAZZO FLOORING REPAIRING AND RE-FINISHING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:

- 1. Repairing and patching existing cement terrazzo flooring.
- 2. Re-finishing existing cement terrazzo flooring.

1.3 SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed repair or patching product and for each color and texture proposed, 6inches in size.
- C. Samples for Verification: NTMA color plates showing the full range of colors and patterns available for each terrazzo type.
- D. Qualification Data: For Installer.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For terrazzo to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer who is a contractor member of NTMA.
- B. Mockups: Install mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 - 1. Build mockups for terrazzo including accessories.
 - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.

- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Maintain temperature above 50 deg F for 48 hours before and during terrazzo installation.
- B. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo repair and re-finishing.
- C. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- D. Control and collect water and dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.

2.2 PORTLAND CEMENT TERRAZZO

- A. Materials:
 - 1. Portland Cement: ASTM C 150, Type 1.
 - a. Color for Exposed Matrix: Match existing terrazzo.
 - 2. Water: Potable.
 - 3. Sand: ASTM C 33/C 33M.
 - 4. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or foreign matter.
 - a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
 - b. 24-Hour Absorption Rate: Less than 0.75 percent.
 - c. Dust Content: Less than 1.0 percent by weight.
 - 5. Matrix Pigments: Pure mineral or synthetic pigments, alkali resistant, durable under exposure to sunlight, and compatible with terrazzo matrix.
 - 6. Bonding Agent: Neat portland cement, or epoxy or acrylic bonding agents formulated for use with topping indicated.

2.3 MISCELLANEOUS ACCESSORIES

- A. Portland Cement Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by cleaner manufacturer for use on terrazzo type indicated.
- B. Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo color or physical properties; is recommended by sealer manufacturer; and complies with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated.
 - 1. Surface Friction: Not less than 0.6 according to ASTM D 2047.
 - 2. Acid-Base Properties: With pH factor between 7 and 10.
 - 3. Sealers shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

3.2 PREPARATION

- A. Where infill patching repair is required, clean exposed substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.
 - 1. Roughen concrete substrates before installing terrazzo system according to NTMA's written recommendations.
- B. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
- C. Protect other work from water and dust generated by grinding operations. Control water and dust to comply with environmental protection regulations.
 - 1. Erect and maintain temporary enclosures and other suitable methods to limit water damage and dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

3.3 REPAIRING CHIPS AND CRACKS IN CEMENT TERRAZZO

- A. Cut out and replace terrazzo areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound if tapped. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by Architect.
- B. Patching Cement Terrazzo:

1. With a power saw or hand tools, cut a vertical perimeter wall around the area to be patched.
2. Clean the surface of debris and saturate the void with water.
3. Apply cement paste and work into surface. Do not allow cement paste to dry before placing terrazzo composition.
4. Mix terrazzo composition, matching marble chips and matrix for existing terrazzo by size, mineral content, and color.
5. Place mixture over chip or crack and level with a trowel.
6. Compact patch, removing all excess water and cement from the surface.
7. Cover the patch with paper or polyethylene sheeting to prevent quick hydration. Cure until topping develops sufficient strength to prevent lifting or pulling of terrazzo chips during grinding.
8. Sand surface with hand sander or small grinding tool, using fine stones to achieve desired finish.
 - a. Use a #40 or finer grit stone for the initial grinding, exposing the marble chips. Follow with a fine #80 grit stone before grouting with cement to fill all pinholes.
 - b. Be careful grinding around dividing strips.
 - c. Cover grouted surface with paper or polyethylene for at least 72 hours.
 - d. Thoroughly rinse the surface with clean water; remove excess water.
 - e. Machine- or hand-apply grout using matching Portland Cement, filling all voids completely.
 - f. Final polish with a #80 or finer grit stone. Care should be taken to limit grinding and polishing to a small distance beyond the perimeter of the patch.
9. Seal patch with a colorless, slip and stain resistant penetrating sealer with pH factor between 7 and 10, that does not affect color or physical properties of the terrazzo.

3.4 RESTORATION OF TERRAZZO FINISH

A. Re-Grinding Existing Terrazzo Floors:

1. Grind existing terrazzo with conventional terrazzo grinding equipment according to trade practice. Do not grind using lighter duty machines such as floor scrubbers or buffing machines.
 - a. For small areas use hand sander or small grinding tool.
2. Grind with 24 or finer grit stone or with fine mesh sand, all in the presence of water.
3. Follow initial grind with 80 or finer grit stones in the presence of water. Do not use sand for the second pass grinding.

3.5 CLEANING AND PROTECTION

A. Terrazzo Cleaning:

1. Remove grinding dust from installation and adjacent areas.
2. Wash surfaces with a neutral cleaner immediately after final cleaning of terrazzo flooring according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow them to dry thoroughly

B. Sealing:

1. Seal surfaces according to NTMA's written recommendations.
2. Apply sealer according to sealer manufacturer's written instructions.
3. Apply two coats of wax according to NTMA's written recommendations.

C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

END OF SECTION 096613

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following exterior substrates:
 - 1. Steel.
 - 2. Galvanized metal.
 - 3. Exterior portland cement plaster (stucco).

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.

2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

D. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.7 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements.

B. Products: Subject to compliance with requirements, listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- D. Colors: As selected by Architect from manufacturer's full range.

2.3 BLOCK FILLERS

- A. Block Filler, Latex, Interior/Exterior: MPI #4.

2.4 PRIMERS/SEALERS

- A. Primer, Alkali Resistant, Water Based: MPI #3.
- B. Primer, Bonding, Water Based: MPI #17.

2.5 METAL PRIMERS

- A. Primer, Alkyd, Anti-Corrosive for Metal: MPI #79.
- B. Primer, Alkyd, Quick Dry, for Metal: MPI #76.
- C. Primer, Galvanized, Water Based: MPI #134.
- D. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

2.6 WOOD PRIMERS

- A. Primer, Latex for Exterior Wood: MPI #6.

2.7 WATER-BASED PAINTS

- A. Latex, Exterior Flat (Gloss Level 1): MPI #10.
- B. Latex, Exterior Low Sheen (Gloss Level 3-4): MPI #15.

- C. Latex, Exterior Semi-Gloss (Gloss Level 5): MPI #11.
- D. Latex, Exterior, Gloss (Gloss Level 6: MPI #119.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Wood: 15 percent.
 - 2. Portland Cement Plaster: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

- D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- G. Wood Substrates:
 - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Paint entire exposed surface of window frames and sashes.
 - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
 - 6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.
- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINTING SCHEDULE

A. Steel Substrates:

1. Water-Based Light Industrial Coating System:

- a. Prime Coat: Primer, alkyd, anti-corrosive for metal, MPI #79.
- b. Prime Coat: Shop primer specified in Section where substrate is specified.
- c. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
- d. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3), MPI #161.
- e. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5), MPI #163.
- f. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6), MPI #164.

B. Galvanized-Metal Substrates:

1. Latex System:

- a. Prime Coat: Primer, galvanized, water based, MPI #134.
- b. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
- c. Intermediate Coat: Latex, exterior, matching topcoat.
- d. Topcoat: Latex, exterior flat (Gloss Level 1)[, MPI #10].
- e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4)[, MPI #15].
- f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[, MPI #11].
- g. Topcoat: Latex, exterior gloss (Gloss Level 6)[, MPI #119].

2. Water-Based Light Industrial Coating System:

- a. Prime Coat: Primer, galvanized, water based, MPI #134.
- b. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
- c. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.

- d. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3), MPI #161.
 - e. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5), MPI #163.
 - f. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6), MPI #164.
- C. Stainless-Steel Substrates:
- 1. Latex System:
 - a. Prime Coat: Primer, bonding, solvent based, MPI #69.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior flat (Gloss Level 1), MPI #10.
 - d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4), MPI #15.
 - e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.
 - f. Topcoat: Latex, exterior gloss (Gloss Level 6), MPI #119.
 - 2. Water-Based Light Industrial Coating System:
 - a. Prime Coat: Primer, quick dry, for aluminum, MPI #95.
 - b. Intermediate Coat: Light industrial coating, exterior, water based, matching topcoat.
 - c. Topcoat: Light industrial coating, exterior, water based (Gloss Level 3), MPI #161.
 - d. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5), MPI #163.
 - e. Topcoat: Light industrial coating, exterior, water based, gloss (Gloss Level 6), MPI #164.
- D. Wood Substrates: Including wood trim, architectural woodwork, doors, windows, etc.
- 1. Latex System:
 - a. Prime Coat: Primer, latex for exterior wood, MPI #6.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior flat (Gloss Level 1), MPI #10.
 - d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4), MPI #15.
 - e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.
 - f. Topcoat: Latex, exterior gloss (Gloss Level 6), MPI #119.
- E. Portland Cement Plaster Substrates:
- 1. Latex System:
 - a. Prime Coat: Latex, exterior, matching topcoat.
 - b. Intermediate Coat: Latex, exterior, matching topcoat.
 - c. Topcoat: Latex, exterior flat (Gloss Level 1), MPI #10.
 - d. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4), MPI #15.
 - e. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.
 - f. Topcoat: Latex, exterior gloss (Gloss Level 6), MPI #119.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section includes surface preparation and the application of paint systems on the following interior substrates:

- 1. Steel.
- 2. Galvanized metal.
- 3. Wood.
- 4. Gypsum board.
- 5. Plaster.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.

- C. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 DELIVERY, STORAGE, AND HANDLING

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

1.7 FIELD CONDITIONS

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

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements.
- B. Products: Subject to compliance with requirements, listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
 - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
 - 1. Flat Paints and Coatings: 50 g/L.
 - 2. Nonflat Paints and Coatings: 150 g/L.
 - 3. Primers, Sealers, and Undercoaters: 200 g/L.
 - 4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
 - 5. Pretreatment Wash Primers: 420 g/L.
 - 6. Shellacs, Clear: 730 g/L.
 - 7. Shellacs, Pigmented: 550 g/L.
- D. Colors: As selected by Architect from manufacturer's full range.

2.3 BLOCK FILLERS

- A. Block Filler, Latex, Interior/Exterior: MPI #4.

2.4 PRIMERS/SEALERS

- A. Primer Sealer, Latex, Interior: MPI #50.
- B. Primer, Alkali Resistant, Water Based: MPI #3.
- C. Primer, Latex, for Interior Wood: MPI #39.
- D. Primer, Bonding, Water Based: MPI #17.
- E. Primer, Bonding, Solvent Based: MPI #69]

2.5 METAL PRIMERS

- A. Primer, Rust-Inhibitive, Water Based: MPI #107.
- B. Primer, Galvanized, Water Based: MPI #134.

2.6 WATER-BASED PAINTS

- A. Latex, Interior, Flat, (Gloss Level 1): MPI #53.
- B. Latex, Interior, (Gloss Level 2): MPI #44.
- C. Latex, Interior, (Gloss Level 3): MPI #52.
- D. Latex, Interior, (Gloss Level 4): MPI #43.
- E. Latex, Interior, Semi-Gloss, (Gloss Level 5): MPI #54.
- F. Latex, Interior, Gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees): MPI #114.
- G. Latex, Interior, High Performance Architectural, (Gloss Level 2): MPI #138.
- H. Latex, Interior, High Performance Architectural, (Gloss Level 3): MPI #139.
- I. Latex, Interior, High Performance Architectural, (Gloss Level 4): MPI #140.
- J. Latex, Interior, High Performance Architectural, Semi-Gloss (Gloss Level 5): MPI #141.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Wood: 15 percent.
 - 2. Gypsum Board: 12 percent.
 - 3. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
- E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- G. Wood Substrates:
 - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

3.3 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
 - 3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
 - 4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

C. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

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

3.5 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

a. Prime Coat: Latex, interior, matching topcoat.

b. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53.

B. Steel Substrates:

1. High-Performance Architectural Latex System:

a. Prime Coat: Primer, alkyd, anti-corrosive, for metal, MPI #79.

b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.

c. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5), MPI #141.

C. Galvanized-Metal Substrates:

1. High-Performance Architectural Latex System:

- a. Prime Coat: Primer, galvanized, water based, MPI #134.
 - b. Topcoat: Latex, interior, high performance architectural, semi-gloss (Gloss Level 5), MPI #141.
- D. Wood Substrates: Including wood trim, architectural woodwork, doors, windows, etc.
- 1. Latex System:
 - a. Prime Coat: Primer, latex, for interior wood, MPI #39.
 - b. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.
- E. Gypsum Board, Plaster Substrates:
- 1. Latex System:
 - a. Prime Coat: Latex, interior, matching topcoat.
 - b. Intermediate Coat: Latex, interior, matching topcoat.
 - c. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53.

END OF SECTION 099123

SECTION 102113 - TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes stainless-steel toilet compartments configured as toilet enclosures and urinal screens.
- B. Related Requirements:
 - 1. Section 102800 "Toilet, Bath, and Laundry Accessories" for toilet tissue dispensers, grab bars, purse shelves, and similar accessories mounted on toilet compartments.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for toilet compartments.
- B. Shop Drawings: For toilet compartments.
 - 1. Include plans, elevations, sections, details, and attachment details.
 - 2. Show locations of cutouts for compartment-mounted toilet accessories.
 - 3. Show locations of reinforcements for compartment-mounted grab bars and locations of blocking for surface-mounted toilet accessories.
 - 4. Show locations of centerlines of toilet fixtures.
- C. Samples: For the following products, in manufacturer's standard sizes unless otherwise indicated:
 - 1. Each type of material, color, and finish required for toilet compartments, prepared on **6-inch- (152-mm-)** square Samples of same thickness and material indicated for Work.
 - 2. Each type of hardware and accessory.

1.4 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities for toilet compartments designated as accessible.

2.2 STAINLESS-STEEL TOILET COMPARTMENTS

- A. **Buy America:** Steel products in this section are subject to Buy America coverage.
- B. Toilet-Enclosure Style: Floor anchored, overhead braced.
- C. Urinal-Screen Style: Wall hung flat panel.
- D. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
 - 1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of **1 inch (25 mm)** for doors and panels and **1-1/4 inches (32 mm)** for pilasters.
 - 2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units of size and material adequate for panel to withstand applied downward load on grab bar of at least **250 lbf (1112 N)**, when tested according to ASTM F 446, without deformation of panel.
 - 3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.
- E. Urinal-Screen Construction:
 - 1. Flat-Panel Urinal Screen: Matching panel construction.
- F. Facing Sheets and Closures: Stainless-steel sheet of nominal thicknesses as follows:
 - 1. Pilasters, Braced at Both Ends: Manufacturer's standard thickness, but not less than **0.038 inch (0.95 mm)**.
 - 2. Panels: Manufacturer's standard thickness, but not less than 0.031 inch (0.79 mm)].
 - 3. Doors: Manufacturer's standard thickness, but not less than 0.031 inch (0.79 mm).

4. Flat-Panel Urinal Screens: Thickness matching the panels.
- G. Pilaster Shoes and Sleeves (Caps): Stainless-steel sheet, not less than 0.031-inch (0.79-mm) nominal thickness and 3 inches (76 mm) high, finished to match hardware.
- H. Brackets (Fittings):
 1. Stirrup Type: Ear or U-brackets; stainless steel.
- I. Stainless-Steel Finish: No. 4 bright, directional polish on exposed faces. Protect exposed surfaces from damage by application of strippable, temporary protective covering before shipment.

2.3 HARDWARE AND ACCESSORIES

- A. **Buy America:** Steel products in this section are subject to Buy America coverage.
- B. Hardware and Accessories: Manufacturer's standard operating hardware and accessories.
 1. Material: Stainless steel.
 2. Hinges: Manufacturer's standard paired, self-closing type that can be adjusted to hold doors open at any angle up to 90 degrees, allowing emergency access by lifting door.
 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories.
 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- C. Overhead Bracing: Manufacturer's standard continuous, extruded-aluminum head rail with antigrip profile and in manufacturer's standard finish.
- D. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless-steel, hot-dip galvanized-steel, or other rust-resistant, protective-coated steel anchors compatible with related materials.

2.4 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 666, Type 304, stretcher-leveled standard of flatness.

- B. Stainless-Steel Castings: ASTM A 743/A 743M.

2.5 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories and solid blocking within panel where required for attachment of toilet accessories.
- B. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.
- C. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.
- D. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for fastening, support, alignment, operating clearances, and other conditions affecting performance of the Work.
 - 1. Confirm location and adequacy of blocking and supports required for installation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
 - 1. Maximum Clearances:
 - a. Pilasters and Panels: 1/2 inch (13 mm).
 - b. Panels and Walls: 1 inch (25 mm).
 - 2. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than three brackets attached at midpoint and near top and bottom of panel.

- a. Locate wall brackets so holes for wall anchors occur in masonry or tile joints.
 - b. Align brackets at pilasters with brackets at walls.
- B. Overhead-Braced Units: Secure pilasters to floor and level, plumb, and tighten. Set pilasters with anchors penetrating not less than **1-3/4 inches (44 mm)** into structural floor unless otherwise indicated in manufacturer's written instructions. Secure continuous head rail to each pilaster with no fewer than two fasteners. Hang doors to align tops of doors with tops of panels, and adjust so tops of doors are parallel with overhead brace when doors are in closed position.
- C. Floor-Anchored Units: Set pilasters with anchors penetrating not less than **2 inches (51 mm)** into structural floor unless otherwise indicated in manufacturer's written instructions. Level, plumb, and tighten pilasters. Hang doors and adjust so tops of doors are level with tops of pilasters when doors are in closed position.
- D. Urinal Screens: Attach with anchoring devices to suit supporting structure. Set units level and plumb, rigid, and secured to resist lateral impact.

3.3 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 102113

SECTION 102800 – TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract.

1.2 SUMMARY

- A. Section Includes:
 - 1. Public-use washroom accessories.
 - 2. Childcare accessories.
 - 3. Underlavatory guards.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include the following:
 - 1. Construction details and dimensions.
 - 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
 - 3. Material and finish descriptions.
 - 4. Features that will be included for Project.
- B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
 - 1. Identify locations using room designations indicated.
- C. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.

- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. **Buy America:** Steel products in this section are subject to Buy America coverage.
- B. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- C. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- D. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
- E. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
- F. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.
- G. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- H. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

2.2 PUBLIC-USE WASHROOM ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - 1. A & J Washroom Accessories, Inc.
 - 2. American Specialties, Inc.
 - 3. Bobrick Washroom Equipment, Inc.
 - 4. Bradley Corporation.
 - 5. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
 - 6. Tubular Specialties Manufacturing, Inc.
- B. Toilet Tissue (Roll) Dispenser:
 - 1. Basis-of-Design Product: Bobrick; B-2888 or American Specialties 20030 or approved equal. Requests for approved equal status must be submitted and approved by the Owner during the Bid Phase of the Project.

2. Description: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
 3. Mounting: Surface mounted.
 4. Operation: Noncontrol delivery with standard spindle.
 5. Capacity: Designed for 4-1/2- or 5-inch- (114- or 127-mm-) diameter tissue rolls.
 6. Material and Finish: Stainless steel, No. 4 finish (satin).
- C. Toilet Tissue (Roll) Dispense with Seat Cover Dispenser and Sanitary Napkin Disposal:
1. Basis-of-Design Product: Bobrick; B-3571 or American Specialties 0484 or approved equal. Requests for approved equal status must be submitted and approved by the Owner during the Bid Phase of the Project
 2. Description: Partition-Mounted.
 3. Mounting: Surface mounted.
 4. Operation: Noncontrol delivery with standard spindle.
 5. Capacity: Designed for 4-1/2- or 5-inch- (114- or 127-mm-) diameter tissue rolls.
 6. Material and Finish: Stainless steel, No. 4 finish (satin).
- D. Seat Cover Dispenser:
1. Basis-of-Design Product: Bobrick; B-221 or American Specialties 20477 or approved equal. Requests for approved equal status must be submitted and approved by the Owner during the Bid Phase of the Project.
 2. Description: Bi-Leveled Opening.
 3. Mounting: Surface mounted.
 4. Operation: Dispense Toilet Seat Covers.
 5. Capacity: Designed for Whole or Folded Seat Covers.
 6. Material and Finish: Stainless steel, No. 4 finish (satin).
- E. Paper Towel (Folded) Dispenser:
1. Basis-of-Design Product: Bobrick; B-262 or American Specialties 20210 or approved equal. Requests for approved equal status must be submitted and approved by the Owner during the Bid Phase of the Project.
 2. Mounting: Surface mounted.
 3. Minimum Capacity: 400 C-fold or 525 multifold towels.
 4. Material and Finish: Stainless steel, No. 4 finish (satin).
 5. Lockset: Tumbler type.
 6. Refill Indicators: Pierced slots at sides or front.
- F. Automatic Hand Dryer:
1. Basis-of-Design Product: Bobrick; B-715 or American Specialties; 0185.
 2. Description: Fan.
 3. Mounting: Surface mounted.
 4. Operation: Infrared Sensor.
 5. Capacity: 2-minutes of air-flow.
 6. Material and Finish: Stainless steel, No. 4 finish (satin).
- G. Liquid-Soap Dispenser:

1. Basis-of-Design Product: Bobrick; B-82216 or American Specialties 0332 or approved equal. Requests for approved equal status must be submitted and approved by the Owner during the Bid Phase of the Project.
2. Description: Designed for dispensing soap in liquid or lotion form.
3. Mounting: Lavatory-Mounted.
4. Capacity: 20 oz.
5. Materials: Stainless Steel, Polyethylene

H. Grab Bar:

1. **Buy America:** Products in this section are subject to Buy America coverage.
2. Basis-of-Design Product: Bobrick; B-6806 or American Specialties; 3200.
3. Mounting: Flanges with exposed fasteners.
4. Material: Stainless steel, 0.05 inch (1.3 mm) thick.
 - a. Finish: Smooth, No. 4 finish (satin) on ends and slip-resistant texture in grip area.
5. Outside Diameter: 1-1/2 inches.
6. Configuration and Length: As indicated on Drawings.

I. Mirror:

1. Basis-of-Design Product: Bobrick; B-165 or American Specialties; 0620
2. Description: Channel Frame.
3. Mounting: Surface mounted.
4. Material and Finish: Stainless steel.

2.3 DAIPER CARE ACCESSORIES

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. American Specialties, Inc.
2. Brocar Products, Inc.
3. Diaper Deck & Company, Inc.
4. GAMCO Specialty Accessories; a division of Bobrick Washroom Equipment, Inc.
5. Koala Kare Products; a division of Bobrick Washroom Equipment, Inc.
6. SSC, Inc.
7. Tubular Specialties Manufacturing, Inc.

B. Diaper-Changing Station (Horizontal):

1. Basis-of-Design Product: Bobrick; KB110-SSWM, or American Specialties; 9013-9.
2. Description: Horizontal unit that opens by folding down from stored position and with child-protection strap.
3. Mounting: Wall-Mounted
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: Stainless steel, No. 4 finish (satin), exterior shell with rounded plastic corners; HDPE interior in manufacturer's standard color.

6. Liner Dispenser: Built in.

C. Diaper-Changing Station (Vertical):

1. Basis-of-Design Product: Bobrick; KB111-SSWM, or Koala Kare; KB111-SSWM.
2. Description: Vertical Station.
3. Mounting: Wall-Mounted
4. Operation: By pneumatic shock-absorbing mechanism.
5. Material and Finish: Stainless steel, No. 4 finish (satin), exterior shell with rounded plastic corners; HDPE interior in manufacturer's standard color.
6. Liner Dispenser: Built in.

2.4 UNDERLAVATORY GUARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Plumberex Specialty Products, Inc.
2. Truebro by IPS Corporation.

B. Underlavatory Guard:

1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.
2. Material and Finish: Antimicrobial, molded plastic, white.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.
- C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

END OF SECTION 102800

SECTION 21 09 00 – FIRE ALARM
SECTION 21 10 00 - WET-PIPE FIRE SUPPRESSION SPRINKLERS
SECTION 22 05 00 – COMMON WORK RESULTS FOR PLUMBING
SECTION 22 11 16 - DOMESTIC WATER PIPING
SECTION 22 13 00 – FACILITY SANITARY SEWERAGE
SECTION 22 14 13 – FACILITY STORM DRAINAGE PIPING
SECTION 22 40 00 - PLUMBING FIXTURES
SECTION 23 05 00 – COMMON WORK RESULTS FOR HVAC
SECTION 23 07 00 - HVAC INSULATION
SECTION 23 09 00 - INSTRUMENTATION AND CONTROL FOR HVAC
SECTION 23 21 00 - HYDRONIC PIPING AND PUMPS
SECTION 23 30 00 – HVAC AIR DISTRIBUTION
SECTION 23 34 23 – HVAC POWER VENTILATORS
SECTION 23 37 13 - DIFFUSERS, REGISTERS, AND GRILLES
SECTION 23 52 00 - HEATING BOILERS
SECTION 23 57 33 - GEOTHERMAL PIPING
SECTION 23 81 46 - WATER-SOURCE UNITARY HEAT PUMPS
SECTION 23 82 19 - FAN-COIL UNITS
SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL
SECTION 26 24 16 - PANELBOARDS
SECTION 26 27 26 - WIRING DEVICES
SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS
SECTION 26 50 00 - LIGHTING

SECTION 21 09 00 – FIRE ALARM

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: Non-coded system with manual and automatic alarm initiation. Alarms include bells, horns, and xenon-strobe units.
- B. Submittals: System operating description.
- C. Submit system plans, connection diagrams, and component descriptions to authorities having jurisdiction.
- D. Comply with NFPA 70.
- E. Comply with NFPA 72.
- F. UL listed and labeled.

PART 2 - PRODUCTS

2.1 ALARM-INITIATING DEVICES

- A. Manual Pull Stations: Double acting, metal or plastic, red in color with molded, raised-letter operating instructions in contrasting color.
- B. Smoke Detectors: UL 268, 24-V dc, self-restoring, photoelectric type, plug-in arrangement.

2.2 ALARM-INDICATING DEVICE

- A. Horns: Electric-vibrating-polarized type, 90 dB at 10 feet.
- B. Visual Alarm Device: Xenon-strobe lights with the word "FIRE" engraved in 1-inch-high letters. Rated Light Output: 110 candelas.
- C. Central Fire Alarm Control Panel: UL 864.
- D. Emergency Power Supply: Components include nickel-cadmium battery.
- E. Wires: Solid copper, with 600-V-rated, 75°C, color-coded insulation.
 - 1. Low-Voltage Circuits: No.18 AWG, minimum.
 - 2. Line-Voltage Circuits: No.12 AWG, minimum.

3. Power-Limited Circuits: NFPA 70, Types FPL, FPLR, FPLP,

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install and test systems according to NFPA 72.
- B. Wiring Method: Install wiring finished in concealed spaces.
- C. Ground cable shields and equipment.

END OF SECTION - 21 09 00

SECTION 21 10 00 - WET-PIPE FIRE SUPPRESSION SPRINKLERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data for valves, sprinklers, specialties, and alarms.
 - 1. Submit sprinkler system drawings identified as "working plans" and calculations according to NFPA 13. Submit required number of sets to authorities having jurisdiction for review, comment, and approval. Include system hydraulic calculations where applicable.
 - 2. Submit test reports and certificates as described in NFPA 13.
- B. Design and Installation Approval: Acceptable to authorities having jurisdiction.
- C. Hydraulically design sprinkler systems according to NFPA 13.
- D. Comply with NFPA 13 and NFPA 70.
- E. UL-listed and -labeled and FMG-approved pipe and fittings.

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. Steel Pipe: ASTM A 53/A 53M, ASTM A 135, or ASTM A 795.
- B. CPVC Plastic Pipe: ASTM F 442, UL 1821, 175-psig rating, made in NPS (DN) for sprinkler service. Include "Listed" and "CPVC Sprinkler Pipe" marks on pipe.
- C. Cast-Iron Threaded Flanges: ASME B16.1, Class 250, raised ground face, bolt holes spot faced.
- D. Cast-Iron Threaded Fittings: ASME B16.4, Class 250, standard pattern.
- E. Grooved-End Fittings: UL-listed and FMG-approved, ASTM A 536, Grade 65-45-12 ductile iron or ASTM A 47 Grade 32510 malleable iron, with grooves or shoulders designed to accept grooved couplings.
- F. Grooved-End Couplings: UL 213, ASTM A 536 ductile-iron or ASTM A 47 malleable-iron housing, with enamel finish. Include gaskets, bolts, and accessories.

- G. Steel Press-Seal Fittings: UL 213, FMG approved, 175-psig pressure rating, for use with Schedule 5, plain-end, steel pipe and fitting manufacturer's pressure sealing tools. Include carbon-steel housing, butylene O-rings, and pipe stop.
- H. CPVC Plastic Pipe Fittings: ASTM F 438 for NPS 3/4 to NPS 1-1/2 and ASTM F 439 for NPS 2, UL listed, 175-psig rating, for sprinkler service. Include "Listed" and "CPVC Sprinkler Fitting" marks on fittings.

2.2 VALVES

- A. Fire-Protection Service Valves: UL listed and FMG approved, with 175-psig non-shock minimum working-pressure rating. Valves for use with grooved piping may be grooved type. Indicating valves shall be butterfly or ball type, bronze body with threaded ends, and integral indicating device with visual indicator.
- B. Gate Valves: UL 262, cast bronze, threaded ends, solid wedge, outside screw and yoke, rising stem.
- C. Swing Check Valves, NPS 2 and Smaller: UL 312 or MSS SP-80, Class 150; bronze body with bronze disc and threaded ends.
- D. Swing Check Valves, NPS 2-1/2 and Larger: UL 312, cast-iron body and bolted cap, with bronze disc or cast-iron disc with bronze-disc ring and flanged ends.
- E. Alarm Check Valves: UL 193, 175-psig working pressure, designed for horizontal or vertical installation, with cast-iron flanged inlet and outlet, bronze grooved seat with O-ring seals, and single-hinge pin and latch design. Include trim sets for bypass, drain, electric sprinkler alarm switch, pressure gages, retarding chamber, fill-line attachment with strainer, and drip cup assembly.
- F. Ball Drip Valves: UL 1726, automatic drain valve, NPS 3/4, ball check device with threaded ends.

2.3 SPRINKLERS

- A. Automatic Sprinklers: With heat-responsive element complying with the following:
 - 1. UL 199, for applications except residential.
 - 2. UL 1626, for residential applications.
 - 3. UL 1767, for early-suppression, fast-response applications.
- B. Sprinkler Types and Categories: Nominal 1/2-inch orifice for "Ordinary" temperature classification rating, unless otherwise indicated or required by application.
- C. Sprinkler types include the following:
 - 1. Upright, pendent, and sidewall sprinklers.

2. Extended coverage and quick-response sprinklers.
 3. Pendent and sidewall, dry-type sprinklers.
- D. Sprinkler Finishes: Chrome plated and bronze.
- E. Sprinkler Escutcheons: Chrome-plated steel, one piece, flat.
- F. Sprinkler Guards: Wire-cage type, including fastening device.
- G. Sprinkler Cabinets: Finished steel cabinet and hinged cover, with space for minimum of 6 spare sprinklers plus sprinkler wrench, suitable for wall mounting. Include number of sprinklers required by NFPA 13 and one wrench for sprinklers. Include separate cabinet with sprinklers and wrench for each style sprinkler on Project.

2.4 SPECIALTIES AND ALARMS

- A. Fire Department Connections: UL 405, flush, wall-type, with cast-brass body; NH-standard thread inlets matching local fire department threads; and having two NPS 2-1/2 inlets and NPS 4 outlet.
1. Inlet Alignment: Inline, horizontal, unless otherwise indicated.
 2. Direction of Outlet: Back, unless otherwise indicated.
 3. Finish: Polished brass.
- B. Water-Flow Indicators: UL 346; electrical-supervision, vane-type water-flow detector; with 250-psig pressure rating; and designed for horizontal or vertical installation. Include 2 single-pole, double-throw, circuit switches for isolated alarm and auxiliary contacts, 7 A, 125-V ac and 0.25 A, 24-V dc; complete with factory-set, field-adjustable retard element to prevent false signals and tamperproof cover that sends signal if removed.
- C. Pressure Switches: UL 753; electrical-supervision-type, water-flow switch with retard feature. Include single-pole, double-throw, normally closed contacts and design that operates on rising pressure and signals water flow.
- D. Valve Supervisory Switches: UL 753; electrical; single-pole, double throw; with normally closed contacts. Include design that signals controlled valve is in other than fully open position.
- E. Pressure Gages: UL 393, 3-1/2- to 4-1/2-inch- diameter dial with dial range of 0 to 250 psig.

PART 3 - EXECUTION

3.1 PIPE AND FITTING APPLICATION

- A. Use steel pipe with threaded, roll-grooved, or cut-grooved joints; copper tube with wrought-copper fittings and brazed joints; or CPVC plastic pipe and fittings and metal-to-plastic transition fittings with solvent-cemented joints.
 - 1. For steel pipe joined by threaded fittings, use Schedule 40.
 - 2. For steel pipe joined by welding or roll-grooved pipe and fittings, use Schedule 10.
 - 3. For steel pipe NPS 2 and smaller, joined by press-seal fittings, use Schedule 5 pipe.
- B. Pipe between Fire Department Connections and Check Valves: Use galvanized steel pipe with flanged or threaded joints.
- C. Install shutoff valve, backflow preventer, pressure gage, drain, and other accessories indicated at connection to water service piping.

3.2 PIPING INSTALLATION

- A. Install "Inspector's Test Connections" in sprinkler piping, complete with shutoff valve.
- B. Install sprinkler zone control valves, test assemblies, and drain headers adjacent to standpipes when sprinkler piping is connected to standpipe.
- C. Install ball drip valves to drain piping between fire department connections and check valves, and where indicated. Drain to floor drain or outside building.
- D. Install alarm devices in piping systems.
- E. Protect piping from earthquake damage.
- F. Install pressure gages on riser or feed main, at each sprinkler test connection, and at top of each riser. Install gages to permit removal, and install where they will not be subject to freezing.
- G. Install fire-protection service valves supervised-open, located to control sources of water supply except from fire department connections. Where there is more than one control valve, provide permanently marked identification signs indicating portion of system controlled by each valve.
- H. Install check valve in each water supply connection. Install backflow preventers instead of check valves in potable-water supply sources.
- I. Install alarm check valves in vertical position for proper direction of flow, including bypass check valve and retard chamber drain line connection.

3.3 SPRINKLER APPLICATIONS

- A. Rooms without Ceilings: Upright sprinklers.
- B. Rooms with Suspended Ceilings: Pendent sprinklers.
- C. Wall Mounting: Sidewall sprinklers.
- D. Spaces Subject to Freezing: Pendent dry-type, and sidewall dry-type sprinklers.
- E. Special Applications: Use extended coverage, and quick-response sprinklers where indicated.
- F. Sprinkler Finishes: Chrome plated in finished spaces exposed to view, rough bronze in unfinished spaces not exposed to view, and dull chrome in residential spaces.
- G. Install sprinklers in suspended ceilings in center of panels.

3.4 SPECIALTIES AND ALARMS INSTALLATIONS

- A. Install fire department connections with ball drip valves installed at each check valve for fire department connection to mains. Extend to floor drain or outside building.
- B. Connect alarm devices to fire alarm system.

3.5 TESTING

- A. Perform field acceptance tests of each fire-protection system.
- B. Flush, test, and inspect sprinkler piping systems according to NFPA 13, Chapter "System Acceptance."

END OF SECTION - 21 10 00

SECTION 22 05 00 – COMMON WORK RESULTS FOR PLUMBING

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS

2.1 GENERAL-DUTY VALVES

- A. End Connections: Threads shall comply with ANSI B1.20.1. Flanges shall comply with ANSI B16.1 for cast-iron valves and ANSI B16.24 for bronze valves. Solder-joint connections shall comply with ANSI B16.18.
- B. Electric Actuated Flow Control Valves: Direct mount with brass PTFE seats, and 600-psig minimum CWP rating.
- C. One-Piece, Copper-Alloy Ball Valves: Brass or bronze body with chrome-plated bronze ball, PTFE or TFE seats, and 400-psig minimum CWP rating.
- D. Bronze Swing Check Valves: Class 125, bronze body with bronze disc and seat.
- E. Bronze Gate Valves: Class 125, bronze body with non-rising stem and bronze solid wedge.
- F. Cast-Iron Gate Valves: Class 125, non-rising cast-iron body and solid-wedge disc.
- G. Bronze Globe Valves: Class 125, bronze body with bronze disc and union-ring bonnet.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Use gate and ball valves for shutoff duty; electric actuator valve for throttling duty.
- B. Locate valves for easy access and provide separate support where necessary.
- C. Install valves for each fixture and item of equipment.
- D. Install three-valve bypass around each pressure-reducing valve using throttling-type valves.
- E. Install valves in horizontal piping with stem at or above center of pipe.
- F. Install valves in a position to allow full stem movement.

- G. Install check valves for proper direction of flow in horizontal position with hinge pin level.

END OF SECTION – 22 05 00

SECTION 22 11 16 - DOMESTIC WATER PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Performance Requirements: Unless otherwise indicated, minimum pressure requirements for water piping are as follows:
 - 1. Domestic Water Piping: 80 psig.
- B. Comply with NSF 14, "Plastic Piping Components and Materials."
- C. Comply with NSF 61, "Drinking Water System Components -- Health Effects."

PART 2 - PRODUCTS

2.1 PIPE AND FITTINGS

- A. PEX Piping: SDR 9 PEX tube and brass insert-type fittings with corrosion-resistant metal bands.

PART 3 - EXECUTION

3.1 PIPING APPLICATIONS

- A. Install listed pipe materials and joining methods below in the following applications:
 - 1. Aboveground Distribution Piping: PEX piping.

3.2 VALVE APPLICATIONS

- A. Install gate valves close to main on each branch and riser serving two or more plumbing fixtures or equipment connections and where indicated.
- B. Install gate or ball valves on inlet to each plumbing equipment item, on each supply to each plumbing fixture not having stops on supplies, and elsewhere as indicated.
- C. Install drain valve at base of each riser, at low points of horizontal runs, and where required to drain water distribution piping system.

- D. Install swing check valve on discharge side of each pump and elsewhere as indicated.
- E. Install ball valves in each hot-water circulating loop and discharge side of each pump.

3.3 PIPING INSTALLATIONS

- A. Install hangers and supports at intervals indicated in the applicable plumbing code and as recommended by pipe manufacturer.
- B. Support vertical piping at each floor.

3.4 INSPECTING AND CLEANING

- A. Inspect and test piping systems following procedures of authorities having jurisdiction.
- B. Clean and disinfect water distribution piping following procedures of authorities having jurisdiction.

END OF SECTION 22 11 16

SECTION 22 13 00 – FACILITY SANITARY SEWERAGE

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Minimum Pressure Requirement for Soil, Waste and Vent: 10 feet head.
- B. Comply with NSF 14, "Plastic Piping Components and Related Materials."

PART 2 - PRODUCTS

2.1 PIPES AND FITTINGS

- A. Hubless, Soil Pipe: Cast-iron pipe and hubless, cast-iron fittings with neoprene sealing sleeve and stainless-steel corrugated shield and clamp assembly.

PART 3 - EXECUTION

3.1 PIPE APPLICATIONS

- A. Aboveground applications: Hubless, cast-iron soil pipe and fittings.

3.2 PIPING INSTALLATION

- A. Install cleanout and extension to grade at connection of building sanitary drain and building sanitary sewer.
- B. Locate drainage piping runouts as close as possible to bottom of floor slab supporting fixtures or drains.
- C. Install cast iron piping to existing roof drains to allow for proper drainage of the roof.

3.3 INSPECTION

- A. Inspect and test piping systems following procedures of authorities having jurisdiction.

END OF SECTION 22 13 00

SECTION 221413 - FACILITY STORM DRAINAGE PIPING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Minimum Pressure Requirement for Storm Drainage: 10 feet head.
- B. Comply with NSF 14, "Plastic Piping Components and Related Materials."

PART 2 - PRODUCTS

2.1 PIPES AND TUBES

- A. Copper Drainage Tube: Type DWV, drawn temper with wrought or cast-copper, solder joint, Type DWV fittings per plans.
- B. Hub-and-Spigot, Soil Pipe and Fittings: Service class cast-iron; rubber gaskets.
- C. Hubless, Soil Pipe and Fittings: Cast-iron pipe and fittings with neoprene sealing sleeve, with stainless-steel, corrugated shield-and-clamp assembly.
- D. PVC Plastic, DWV Pipe: Schedule 40, plain ends pipe with PVC socket-type; drain, waste, and vent pipe patterns.

PART 3 - EXECUTION

3.1 PIPE APPLICATIONS

- A. Aboveground Applications: Hubless, cast-iron soil pipe and fittings, Hub-and-spigot, cast-iron soil pipe and fittings, Copper drainage tube and fittings with soldered joints.
- B. Belowground Applications: Hubless, cast-iron soil pipe and fittings, Hub-and-spigot, cast-iron soil pipe and fittings, PVC plastic, DWV pipe and fittings with solvent-cemented joints.

3.2 PIPING INSTALLATION

- A. Install cleanout and extension to grade at connection of building storm drain and storm sewer.
- B. Locate drainage piping runouts as close as possible to bottom of floor slab supporting drains.

3.3 INSPECTION

- A. Inspect and test piping systems following procedures of authorities having jurisdiction.

END OF SECTION 22 14 13

SECTION 22 40 00 - PLUMBING FIXTURES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data for each type of plumbing fixture.
- B. Comply with requirements of Public Law 102-486, "Energy Policy Act," regarding water flow rate and water consumption of plumbing fixtures.
- C. Comply with applicable standards below:
 - 1. National Sanitation Foundation Construction: NSF 61.
 - 2. Public Law 90-480, "Architectural Barriers Act"; and Public Law 101-336, "Americans with Disabilities Act."
 - 3. Public Law 102-486, "Energy Policy Act."

PART 2 - PRODUCTS

2.1 WATER CLOSET WC-1 & WC-2

- A. Vitreous-China Water Closet: Elongated, siphon-jet type, wall-hanging outlet with flushometer valve.
 - 1. Products:
 - a. Toto CT708E toilet, Color #01 Cotton
 - b. American Standard AFWALL toilet, 2257.001
 - c. A product of equal specification
- B. Toilet Seat: Elongated solid plastic open front without cover with bumpers and hardware, Commercial, Heavy-Duty class.
 - 1. Products:
 - a. Toto SC534 seat color #01 Cotton
 - b. American Standard commercial toilet seat, #5901.100
 - c. A product of equal specification

- C. Flushometer Valve: Cast-brass body, brass or copper pipe or tubing inlet with wall flange and tailpiece with spud, screwdriver check stop, and vacuum breaker. Polished, chrome-plated, exposed metal parts. 1.6 gal. maximum per flushing cycle.
1. Products:
 - a. American Standard Selectronic Flush Valve, 6067.161.007
 - b. Zurn ZER6003AV-EWS-CPM Model
 - c. A product of equal specification
- D. Fixture Support: Vertically adjustable, cast-iron, water-closet carrier with combination support and waste fitting assemblies and tiling frame or setting gage. Include additional faceplate and coupling for water closet at wide pipe space. Compact-type carrier for back-to-back water-closet installation is prohibited.
1. Products
 - a. Zurn
 - 1) Zurn Z1203-N-XB (single carrier)
 - 2) Zurn Z1203-ND4 (back-to-back ADA toilets)
 - b. Josam
 - 1) Josam 12704 (single carrier)
 - 2) Josam 12704-D4 (ADA toilets)
 - c. A product of equal specification

2.2 URINAL U-1

- A. Vitreous-China Urinal: Washdown type, wall hanging, back outlet.
1. Products:
 - a. Toto UT104EV, Color #01 Cotton
 - b. American Standard Allbrook, 6550.001
 - c. A product of equal specification
- B. Flushometer Valve: Cast-brass body, brass or copper pipe or tubing inlet with wall flange and tailpiece with spud, screwdriver check stop, and vacuum breaker. 0.5 gal maximum per flushing cycle.
1. Products:
 - a. American Standard Selectronic Flush Valve, 6062.051.002
 - b. Zurn ZER6003AV-EWS-CPM Model
 - c. A product of equal specification

- C. Fixture Support: Vertically adjustable, urinal, chair carrier with coupling heavy-duty, upright members; bearing plate; and feet.

- 1. Products:

- a. Zurn Z-1221
 - b. Josam 17550-UR
 - c. A product of equal specification

2.3 LAVATORY L-1

- A. Vitreous-China Lavatory: Wall hanging.

- 1. Products:

- a. (Existing sinks to be reused).

- B. Faucets: ASME A112.18.1M; cast brass and polished, chrome-plated finish, unless otherwise indicated. Maximum 2.5-gpm flow rate.

- 1. Type: Center set with inlets on 4-inch centers and without pop-up waste.
 - 2. Handle(s): Single-lever toggle.
 - 3. Products:

- a. Chicago Faucets 2200-4ABCP Single Lever faucet , 4" fixed centers
 - b. American Standard Colony, Single Control Lavatory Faucet, 2175.200
 - c. A product of equal specification

- C. Drain: Existing drain to be reused.

- D. Trap: Chrome-plated with slip-joint inlet and wall flange.

- E. Supply and Drain Insulation: Soft-plastic covering; removable at stops and handles.

- F. Fixture Support: Hanger plate, vertically adjustable, lavatory, chair carrier with rectangular-steel upright members; and feet.

- 1. Carrier Zurn model Z1224, field verify carrier configuration prior to ordering.

2.4 DRINKING FOUNTAIN WF-1

- A. Stainless-steel, wall-hanging type.

1. Products:
 - a. Elkay EDFP217C two level drinking fountain
 - b. Haws 1011, "Hi-Lo" barrier free, wall mounted drinking fountain
 - c. A product of equal specification

PART 3 - EXECUTION

3.1 INSTALLATIONS

- A. Install fitting insulation kits on fixtures for people with disabilities.
- B. Install fixtures with flanges and gasket seals.
- C. Install flushometer valves for accessible water closets and urinals with handle mounted on wide side of compartment. Install other actuators in locations that are easy for people with disabilities to reach.
- D. Fasten wall-hanging plumbing fixtures securely to supports attached to building substrate when supports are specified, and to building wall construction where no support is indicated.
- E. Fasten floor-mounted fixtures to substrate. Fasten fixtures having holes for securing fixture to wall construction, to reinforcement built into walls.
- F. Fasten wall-mounted fittings to reinforcement built into walls.
- G. Secure supplies to supports or substrate within pipe space behind fixture.
- H. Install individual supply inlets, supply stops, supply risers, and tubular brass traps with cleanouts at fixture.
- I. Install water-supply stop valves in accessible locations.
- J. Install traps on fixture outlets. Omit traps on fixtures having integral traps. Omit traps on indirect wastes, unless otherwise indicated.
- K. Install escutcheons at wall, floor, and ceiling penetrations in exposed, finished locations and within cabinets and millwork. Use deep-pattern escutcheons where required to conceal protruding pipe fittings.
- L. Seal joints between fixtures and walls, floors, and counters using sanitary-type, one-part, mildew-resistant, silicone sealant. Match sealant color to fixture color.

- M. Install piping connections between plumbing fixtures and piping systems and plumbing equipment. Install insulation on supplies and drains of fixtures for people with disabilities.
- N. Ground equipment. Tighten electrical connectors and terminals according to UL 486A and UL 486B.
- O. Verify carrier configuration and lavatory faucet configuration prior to ordering.

END OF SECTION - 22 40 00

SECTION 23 05 00 – COMMON WORK RESULTS FOR HVAC

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS

2.1 MOTOR REQUIREMENTS

A. Motor Characteristics:

1. Motors smaller than 1/2 HP: Single phase.
2. Frequency Rating: 60 Hz.
3. Voltage Rating: NEMA standard voltage selected to operate on nominal circuit voltage.
4. Service Factor: 1.15 for open drip proof motors; 1.0 for totally enclosed motors.
5. Duty: Continuous duty at ambient temperature of 105 deg F and at altitude of 866 feet above sea level.
6. Capacity and Torque Characteristics: Sufficient to start, accelerate, and operate connected loads at designated speeds, at installed altitude and environment, with indicated operating sequence, and without exceeding nameplate ratings or considering service factor.
7. Enclosure: Unless otherwise indicated, open drip proof.

2.2 SUPPORTING DEVICES

- A. Hanger and Pipe Attachments: Factory fabricated with galvanized coatings; nonmetallic coated for hangers in direct contact with copper tubing.
- B. Building Attachments: Powder-actuated-type, drive-pin attachments with pullout and shear capacities appropriate for supported loads and building materials; UL listing and FMG approval for fire-protection systems.
- C. Mechanical-Anchor Fasteners: Insert-type attachments with pullout and shear capacities appropriate for supported loads and building materials; UL listing and FMG approval for fire-protection systems.

2.3 VIBRATION ISOLATION DEVICES

A. Vibration Supports:

1. Elastomeric Mounts <M3.0-1>: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements with factory-drilled, encapsulated top plate for bolting to equipment and with baseplate for bolting to structure

B. Vibration Hangers:

1. Elastomeric Hangers: Double-deflection type, with molded, oil-resistant rubber or neoprene isolator elements bonded to steel housings with threaded connections for hanger rods.

PART 3 - EXECUTION

3.1 GENERAL PIPING INSTALLATIONS

- A. Install piping free of sags and bends.
- B. Install fittings for changes in direction and branch connections.
- C. Install sleeves for pipes passing through concrete and masonry walls and concrete floor and roof slabs.
- D. Exterior Wall, Pipe Penetrations: Mechanical sleeve seals installed in steel or cast-iron pipes for wall sleeves.
- E. Install unions adjacent to each valve and at final connection to each piece of equipment.
- F. Install dielectric coupling and nipple fittings to connect piping materials of dissimilar metals in water and steam piping.

3.2 GENERAL EQUIPMENT INSTALLATIONS

- A. Install equipment to allow maximum possible headroom unless specific mounting heights are not indicated.
- B. Install equipment level and plumb, parallel and perpendicular to other building systems and components in exposed interior spaces, unless otherwise indicated.
- C. Install mechanical equipment to facilitate service, maintenance, and repair or replacement of components. Connect equipment for ease of disconnecting, with minimum interference to other installations. Extend grease fittings to accessible locations.
- D. Install equipment to allow right of way for piping installed at required slope.

3.3 HANGERS AND SUPPORTS

- A. Install building attachments within concrete or to structural steel. Install additional attachments at concentrated loads, including valves, flanges, guides, strainers, expansion joints, and at changes in direction of piping.

- B. Install powder-actuated drive-pin fasteners in concrete after concrete is cured. Do not use in lightweight concrete or in slabs less than 4 inches thick.
- C. Install mechanical-anchor fasteners in concrete after concrete is cured. Do not use in lightweight concrete or in slabs less than 4 inches thick.
- D. Load Distribution: Install hangers and supports so piping live and dead loading and stresses from movement will not be transmitted to connected equipment.
- E. Horizontal-Piping Hangers and Supports: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Adjustable Steel Clevis Hangers (MSS Type 1): For suspension of non-insulated or insulated stationary pipes, NPS 1/2 to NPS 30.
 - 2. Steel Pipe Clamps (MSS Type 4): For suspension of cold and hot pipes, NPS 1/2 to NPS 24, if little or no insulation is required.
 - 3. Pipe Hangers (MSS Type 5): For suspension of pipes, NPS 1/2 to NPS 4, to allow off-center closure for hanger installation before pipe erection.
 - 4. Adjustable Steel Band Hangers (MSS Type 7): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 8.
 - 5. Adjustable Band Hangers (MSS Type 9): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 8.
 - 6. Adjustable Swivel-Ring Band Hangers (MSS Type 10): For suspension of non-insulated stationary pipes, NPS 1/2 to NPS 8.
 - 7. Split Pipe-Ring with or without Turnbuckle-Adjustment Hangers (MSS Type 11): For suspension of non-insulated stationary pipes, NPS 3/8 to NPS 8.
 - 8. U-Bolts (MSS Type 24): For support of heavy pipe, NPS 1/2 to NPS 30.
 - 9. Clips (MSS Type 26): For support of insulated pipes not subject to expansion or contraction.
 - 10. Pipe Saddle Supports (MSS Type 36): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange.
 - 11. Pipe Stanchion Saddles (MSS Type 37): For support of pipes, NPS 4 to NPS 36, with steel pipe base stanchion support and cast-iron floor flange and with U-bolt to retain pipe.
- F. Vertical-Piping Clamps: Unless otherwise indicated and except as specified in piping system Specification Sections, install the following types:
 - 1. Extension Pipe or Riser Clamps (MSS Type 8): For support of pipe risers, NPS 3/4 to NPS 20.
 - 2. Carbon- or Alloy-Steel Riser Clamps (MSS Type 42): For support of pipe risers, NPS 3/4 to NPS 20, if longer ends are required for riser clamps.

END OF SECTION – 23 05 00

SECTION 23 07 00 - HVAC INSULATION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data for each type of mechanical insulation.
- B. Quality Assurance: Labeled with maximum flame-spread index of 25 and maximum smoke-developed index of 50 according to ASTM E 84.

PART 2 - PRODUCTS

2.1 PIPE INSULATION

- A. Flexible Elastomeric Cellular Pipe Insulation: Closed-cell, sponge- or expanded-rubber materials. Comply with ASTM C 534, Type I.

2.2 DUCT AND EQUIPMENT INSULATION

- A. Glass-Fiber Board Insulation: Glass fibers bonded with a thermosetting resin. Comply with ASTM C 612, Type IB, without facing and with all-service jacket manufactured from Kraft paper, reinforcing scrim, aluminum foil, and vinyl film.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install vapor barriers on insulated pipes with surface operating temperatures below 60 deg F.
- B. Insulate fittings, valves, and specialties.
- C. Seal vapor-barrier penetrations for hangers, supports, anchors, and other projections.
- D. Seal ends of flexible elastomeric cellular insulation with adhesive.
- E. Roof Penetrations: Apply insulation for interior applications to a point even with the top of the roof flashing.
- F. Exterior Wall Penetrations: For penetrations of below-grade exterior walls, terminate insulation flush with mechanical sleeve seal.

- G. Interior Walls and Partitions Penetrations: Apply insulation continuously through walls and partitions, except fire-rated walls and partitions.
- H. Fire-Rated Walls and Partitions Penetrations: Terminate insulation at penetrations through fire-rated walls and partitions. Seal around penetration with through-penetration firestop systems specified in Division 7.
- I. Flexible Elastomeric Insulation Installation: Seal joints with adhesive.
- J. Interior Piping System Applications: Insulate the following piping systems:
 - 1. Domestic hot water.
 - 2. Hydronic heat piping.
 - 3. Ground Loop Piping
- K. Do not apply insulation to the following systems, materials, and equipment:
 - 1. Flexible connectors.
 - 2. Fire-protection piping systems.
 - 3. Sanitary drainage and vent piping.
 - 4. Drainage piping located in crawlspaces, unless otherwise indicated.
 - 5. Below-grade piping.
 - 6. Chrome-plated pipes and fittings, except for plumbing fixtures for people with disabilities.
 - 7. Piping specialties, including air chambers, unions, strainers, check valves, plug valves, and flow regulators.
- L. Pipe Insulation Thickness Application Schedule: Insulate piping with the following materials and thicknesses:
 - 1. Domestic Hot Water and Recirculated Hot Water: 1/2-inch flexible elastomeric pipe insulation.
 - 2. Hydronic Heating Piping, 100 to 200°F: 1 inch flexible elastomeric pipe insulation.
- M. Install duct insulation as follows:
 - 1. Install insulation continuously on ducts that penetrate walls and floors, except at fire-rated assemblies terminate insulation at the assembly. Maintain insulation vapor retarder on cold duct.
 - 2. Taper glass-fiber insulation ends at a 45-degree angle and seal with adhesive.
 - 3. Board Insulation Installation: Secure insulation tight and smooth with speed washers and anchor pins. Space anchor pins 18 inches apart each way and 3 inches from insulation joints. Apply vapor-barrier coating compound to insulation in contact, open joints, breaks, punctures, and voids in vapor barrier.
- N. Duct System Applications: Insulate indoor concealed supply- and return-air ducts.

- O. Do not apply insulation to the following systems, materials, and equipment:
 - 1. Metal ducts with duct liner.
 - 2. Flexible connectors.
 - 3. Vibration-control devices.
 - 4. Testing laboratory labels and stamps.
 - 5. Nameplates and data plates.

- P. Duct Insulation Thickness and Application Schedule: Insulate ducts with the following materials and thicknesses:
 - 1. Concealed Applications: Board, 1/2 inches thick.

END OF SECTION – 23 07 00

SECTION 23 09 00 - INSTRUMENTATION AND CONTROL FOR HVAC

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: Electric/electronic controls sequences for Fan Coil Units.
- B. Submittals: Shop Drawings detailing operating control sequences of each item of HVAC equipment and system and Product Data for controllers, sensors, thermostats, actuators, and control valves.
- C. System Description: Remote Temperature sensors located in each restroom fed to their own thermostat/ controller for each fan coil unit.
- D. Operation Sequence: When the restrooms are below the set point temperature, the controller opens the control valve and starts the fan coil unit. Hot water flows through the fan coil heating the room.
- E. Summary: Electric/electronic controls sequences for Ground source heat pumps with hot water coils.
- F. Submittals: Shop Drawings detailing operating control sequences of each item of HVAC equipment and system and Product Data for controllers, sensors, thermostats, actuators, and control valves.
- G. System Description: Remote Temperature sensors located in the waiting room and the back office area fed to their own thermostat/ controller for each unit.
- H. Operation Sequence: When the waiting room and office area are below or above the set point temperature, the controller activates the unit. Outdoor temperature shall be used to determine when the water source heat pumps run and when the hot water coil is used. The hot water coil in the units shall be used until the outdoor air drops below 35⁰F. If it falls below 35⁰F for the outdoor air temperature, both the ground source heat pump and the hot water coil shall operate to maintain heating comfort in the building. Consult ground source heat pump manufacturer for proper operation to assure that ground warmth is not depleted.

PART 2 - PRODUCTS

2.1 THERMAL CONTROLS

- A. Thermostat

1. Products
 - a. Honeywell; TB7100A100 MultiPRO, non-programmable thermostat, see schedule on Drawing M.A.1-1
 - b. Johnson Controls; T601DFH-4, programmable thermostat, see schedule on Drawing M.A.1-1
 - c. A product of equal specification
2. Material: Plastic
3. Finish: Premier White
4. Mounting: Surface

B. SENSOR

1. Products
 - a. Honeywell; TR21, remote temperature sensor, see schedule on Drawing M.A.1-1
 - b. Johnson Controls; SEN-600-1, remote temperature sensor, see schedule on Drawing M.A.1-1
 - c. A product of equal specification
2. Material: Plastic
3. Finish: Premier White
4. Mounting: Surface

C. Thermostat for ground source heat pumps.

1. Products
 - a. Honeywell; programmable thermostat.
 - b. Johnson Controls; T600HPP-4, programmable thermostat.
 - c. A product of equal specification
2. Material: Plastic
3. Finish: Premier White
4. Mounting: Surface

D. SENSOR

1. Products

- a. Honeywell; TR21, remote temperature sensor, see schedule on Drawing M.A.1-1
 - b. Johnson Controls; SEN-600-1, remote temperature sensor.
 - c. A product of equal specification
2. Material: Plastic
 3. Finish: Premier White
 4. Mounting: Surface

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install control wiring concealed, except in mechanical rooms, and according to requirements specified in Division 16 Sections.

END OF SECTION - 23 09 00

SECTION 23 21 00 - HYDRONIC PIPING AND PUMPS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: Heating water piping.

PART 2 - PRODUCTS

2.1 PIPES, TUBES, AND FITTINGS

- A. PEX Piping:

1. Uponor's tubing and brass insert-type fittings with corrosion-resistant metal bands, 200-psig minimum working pressure, 200 deg F maximum operating temperature.
2. SharkBite tubing and brass insert-type fittings with corrosion-resistant metal bands, 200-psig minimum working pressure, 200 deg F maximum operating temperature.
3. A product of equal specification

2.2 HVAC PUMPS

- A. In-Line Circulators: Horizontal in-line circulator, rated for 125-psig minimum working pressure and minimum continuous water temperature of 225 deg F.
 1. P-1, P-2, P-4 Pumps:
 - a. Taco 1900 Series
 - b. Bell & Gossett Series 90
 - c. A product of equal specification
 2. Casing: Radially split, bronze-fitted cast iron.
 3. Impeller: ASTM B 584, cast bronze.
 4. Shaft Coupling: Flexible, capable of absorbing torsional vibration and shaft misalignment.
 5. Motor: Resiliently mounted to pump casing.

- B. Compact, In-Line Circulator: Horizontal, in-line, replaceable-cartridge-design circulator; rated for 125-psig minimum working pressure and minimum continuous water temperature of 225 deg F.
 - 1. P-3, and P-5 Pumps:
 - a. Taco Loadmatch Circulator
 - b. A product of equal specification
 - 2. Casing: Cast bronze or cast iron.
 - 3. Pump and Motor Assembly: On common shaft in hermetically sealed unit.
 - 4. Impeller: Nonmetallic.

2.3 SPECIAL-DUTY VALVES

- A. Electric Actuated Flow Control Valves: Direct mount with brass PTFE seats, and 600-psig (4140-kPa) minimum CWP rating.

PART 3 - EXECUTION

3.1 APPLICATION

- A. Hot Water, NPS 2 and Smaller: Aboveground, use PEX pipe with threaded or compression joints.

3.2 INSTALLATION

- A. Install piping at a uniform slope of 0.2 percent upward in the direction of flow.
- B. Install unions in pipes NPS 2 and smaller, adjacent to each valve, at final connections each piece of equipment, and elsewhere as indicated. Unions are not required on flanged devices.
- C. Install flanges on valves, apparatus, and equipment having NPS 2-1/2 and larger connections.
- D. Install strainers on supply side of each control valve.
- E. Anchor piping to ensure proper direction of expansion and contraction.
- F. Install hanger minimum rod sizes and maximum spacing as required by the applicable Mechanical Code.

- G. Install pumps with access for periodic maintenance, including removal of motors, impellers, couplings, and accessories.
- H. Support pumps and piping so weight of piping is not supported by pumps.
- I. Install electrical connections for power, controls, and devices.

3.3 VALVE INSTALLATIONS

- A. Shutoff Duty: Use gate or ball valves.
- B. Throttling Duty: Use electric actuated flow control valves.
- C. Install shutoff-duty valves at supply connection to each piece of equipment, and elsewhere as indicated.
- D. Install calibrated plug valves on the outlet of each heating element and elsewhere as required to facilitate system balancing.
- E. Install drain valves at low points in mains, risers, branch lines, and elsewhere as required for system drainage.
- F. Install safety-relief valves on hot-water generators, and elsewhere as required by authorities having jurisdiction. Pipe discharge to floor without valves.
- G. Install pressure-reducing valves on hot-water generators and elsewhere as required to regulate system pressure.
- H. Install manual air vents at high points in the system, at heat-transfer coils, and elsewhere as required for system air venting.
- I. Install pump discharge valves in horizontal or vertical position with stem in upward position. Allow clearance above stem for check mechanism removal.

3.4 INSTALLATION HVAC PUMPS

- A. Suspend horizontal, in-line pumps independent from piping. Use continuous-thread hanger rods and vibration isolation hangers of sufficient size to support weight of pumps. Fabricate brackets or supports as required for pumps.
- B. Connect piping with valves that are same size as piping connecting to pumps.
- C. Install suction and discharge pipe sizes equal to or greater than diameter of pump nozzles.

- D. Install non-slam check valve and globe valve on discharge side of vertical, in-line pumps.
- E. Install shutoff valve and strainer on suction side of pumps.
- F. Install check valve and throttling valve on discharge side of pumps.
- G. Install pressure gages on suction and discharge of each pump. Install at integral pressure gage tappings where provided.

3.5 TESTING, ADJUSTING, AND BALANCING

- A. Clean and flush hydronic piping systems. Remove, clean, and replace strainer screens.
- B. Hydrostatically test completed piping at a pressure one and one-half times design pressure. Isolate equipment before testing piping. Repair leaks and retest piping until there are no leaks.
- C. Balance water flow within distribution system, including submains, branches, and terminals, to indicated quantities.

END OF SECTION 23 21 00

SECTION 23 30 00 – HVAC AIR DISTRIBUTION

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Summary: Metal and nonmetal ducts and accessories in pressure class 2-inch wg or less and a maximum velocity of 2400 fpm.
- B. Submittals: Product Data for fire and smoke dampers and Shop Drawings detailing duct layout and including locations and types of duct accessories, duct sizes, transitions, radius, special supports details, and inlets and outlet types and locations.
- C. Comply with UL 181 and UL 181A for ducts and closures.

PART 2 - PRODUCTS

2.1 DUCTS

- A. Galvanized Steel Sheet: Forming steel with hot-dip galvanized coating.
- B. Duct Liner: ASTM C 1071, Type II, with an airstream surface coated with a temperature-resistant coating. Thickness: 1/2 inch.
 - 1. Adhesive: ASTM C 916, Type I.
 - 2. Mechanical Fasteners: Galvanized steel pin, length required to penetrate liner plus a 1/8-inch projection maximum into the airstream.
- C. Joint and Seam Tape: Comply with UL 181A.
- D. Joint and Seam Sealant: Comply with UL 181A.
- E. Rectangular Metal Duct Fabrication: Comply with SMACNA's "HVAC Duct Construction Standard" for metal thickness, reinforcing types and intervals, tie-rod applications, and joint types and intervals.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Duct System Pressure Class: Construct and install each duct system for the specific duct pressure classification indicated.

- B. Conceal ducts from view in finished and occupied spaces.
- C. Avoid passing through electrical equipment spaces and enclosures.
- D. Support and connect metal ducts according to SMACNA's "HVAC Duct Construction Standard."

END OF SECTION - 23 30 00

SECTION 23 34 23 – HVAC POWER VENTILATORS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data and Shop Drawings, including mounting details.
- B. Bear the AMCA seal.
- C. Comply with UL 705.

PART 2 - PRODUCTS

2.1 VENTILATORS AND ACCESSORIES

- A. In-Line Centrifugal Fans: In-line, belt-driven centrifugal fans consisting of housing, wheel, outlet guide vanes, fan shaft, bearings, motor and disconnect switch, drive assembly, mounting brackets, and accessories.
 - 1. Accessories:
 - a. Companion Flanges: For inlet and outlet duct connections.
 - b. Motor and Drive Cover (Belt Guard): Epoxy-coated steel.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. In-Line Centrifugal Fans: Suspend units from structural-steel support frame using threaded steel rods and vibration isolation springs.

END OF SECTION - 23 34 23

SECTION 23 37 13 - DIFFUSERS, REGISTERS, AND GRILLES

PART 4 - GENERAL

4.1 SECTION REQUIREMENTS

- A. Submit Product Data, including color charts for factory finishes.

PART 5 - PRODUCTS

5.1 OUTLETS AND INLETS

A. Ceiling Fans:

- 1. Product:
 - a. Cook Gemini; GC-120
 - b. NuTone; 671R Ceiling Fan
 - c. A product of equal specification
- 2. Material: Aluminum
- 3. Finish: Baked enamel
- 4. Mounting: Flush

B. Diffusers:

- 1. Product:
 - a. Titus; CT-580, plenum slot diffuser, schedule on Drawing M1.0-1.
 - b. Carnes; SFTA, Square – Stamped Steel
 - c. A product of equal specification
- 2. Material: Aluminum (a), Stamped Steel (b)
- 3. Finish: Baked enamel, white #26
- 4. Mounting: Flush

C. Wall and Ceiling Grilles:

- 1. Products:

- a. Titus; 350RLF1 return grille, with return filter and access panel, see schedule on Drawing M1.0-1.
 - b. Titus; 50F exhaust grille, see schedule on Drawing M1.0-1.
 - c. Carnes; RSABH Return grille, with return filter and access panel, see schedule on Drawing M1.0-1.
 - d. Carnes; RAEA exhaust grille, see schedule on Drawing M1.0-1.
2. Material: Aluminum (a, b), Steel (c, d)
 3. Finish: Baked enamel, white #26
 4. Mounting: Flush

PART 6 - EXECUTION

6.1 INSTALLATION

- A. Locate ceiling diffusers and grilles, as indicated on general construction "reflected ceiling plans."

END OF SECTION - 23 37 13

SECTION 23 52 00 - HEATING BOILERS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Comply with ASME Boiler and Pressure Vessel Code: Section IV, "Heating Boilers."
- C. Minimum Efficiency: According to ASHRAE/IESNA 90.1.
- D. AGA Compliance: Design certified by AGA, tests and ratings according to AGA requirements.
- E. FMG Compliance: Control devices and sequences according to FMG requirements.
- F. I=B=I tested and rated.
- G. Warranties: Submit a written warranty executed by Contractor agreeing to repair or replace heat exchangers that fail in materials or workmanship within 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PULSE-COMBUSTION CONDENSING BOILERS

- A. Description: Factory-fabricated, -assembled, and -tested pulse-combustion condensing boiler with heat exchanger sealed pressure-tight, built on a steel base; including insulated jacket; flue-gas vent; combustion-air intake connections; water supply, return, and condensate drain connections; and controls.
 - 1. BO-1:
 - a. Weil McLain, Ultra Series 299
 - b. Hydrotherm; R Series R-300 B
 - c. A product of equal specification
- B. Boiler Characteristics and Capacities:
 - 1. Heating Medium: Hot water.
 - 2. Maximum Design Pressure Rating: 60 psig.

3. Entering-Water Temperature: 130 deg F
4. Leaving-Water Temperature: 180 deg F
5. Water Flow Rate: 12 gpm
6. Maximum Pressure Drop: 10 psig (kPa).>
7. Minimum Efficiency: 96.4AFUE
8. DOE Output Capacity: 270 MBh
9. Equivalent Direct Radiation: 234 EDR

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install boilers on and anchor to a 4-inch- thick concrete base.
- B. Install gas-fired boilers according to NFPA 54. Connect gas piping full size to boiler gas-train inlet with union.
- C. Connect piping to supply and return boiler tapings, with shutoff valves.
- D. Connect air intake and exhaust piping to boiler. Use Schedule 40, CPVC pipe and fittings for exhaust and PVC for supply. Solvent-cemented joints. Pitch toward boiler minimum of 2 percent or as indicated. Provide termination as indicated.

END OF SECTION - 23 52 00

SECTION 23 57 33 – GEOTHERMAL PIPING

PART 1 - GENERAL

A. SECTION REQUIREMENTS

1. Submittals: Project Data
2. There is no guarantee to the well field contractor that the location of any existing utilities are exactly as indicated on the plans.

PART 2 - PRODUCTS

A. PIPING

1. The pipe shall be PE3408 HDPE with a minimum cell classification of 345464C per ASTM D3035 and DR11 (160 psi) rating for u-bends and header pipe two inches and smaller and a minimum of DR15.5 (110 psi) for header pipe greater than 2 inch in diameter. This pipe will carry a warranty of no less than 50 years.
2. Each pipe shall be permanently indent marked with the manufacturer's name, nominal size, pressure rating, relevant ASTM standards, cell classification number and date of manufacture.
3. The vertical heat exchanger shall have a factory fused u-bend with pipe lengths long enough to reach grade from the bottom of the bore so no field fusions are required below the header.

B. FITTINGS

1. The pipe fittings shall meet the requirements of ASTM D2683 (for socket fusion fittings) or ASTM D3261 (for butt/saddle fusion fittings). Each fitting shall be identified with the manufacture's name, nominal size, pressure rating, relevant ASTM standards and date of manufacturer. Saddle fusion is not allowed except when performed by a manufacturer normally engaged in that type of work. No field installed saddle fittings are allowed.

C. GROUT

1. The thermally enhanced bentonite based grout used to seal the vertical heat exchanger shall be a minimum of 63% solids. This grout shall also have a permeability rate of less than 1×10^{-7} cm/sec. The silica sand used shall have a 4030 mesh or finer. The minimum grout thermal conductivity is 0.90 Btu/hr-ft-°F (50lb bentonite/200lb silica sand).

PART 3 - EXECUTION

3.1 DRILLING

- A. The vertical boreholes shall be drilled to a depth allowing complete insertion of the vertical heat exchanger to its specified depth (250ft). The maximum borehole diameter shall be six inches. If a larger diameter is required, it must be approved by the design engineer.

3.2 U-BEND ASSEMBLY

- A. The u-bend pipe shall be filled with water and pressurized to 100 psi to check for leaks before insertion.

3.3 GROUTING PROCEDURES

- A. The vertical heat exchanger is to be grouted from the bottom on up in a continuous fashion using a one inch or larger HDPE tremie pipe. The tremie pipe shall be pulled out during the grouting procedure maintaining the pipe's end just below grout level within the borehole.

3.4 HEAT FUSION PIPE JOINING

- A. All underground pipe joining shall be heat fused by socket fusion in accordance to, ASTM D2683 and the manufacturer's heat fusion specifications.

3.5 EXCAVATION AND BACKFILLING

- A. The well field contractor shall do all excavating, backfilling, shoring, bailing and pumping for the installation of their work and perform necessary grading to prevent surface water from flowing into trenches or other excavations. Sewer lines shall not be used for draining trenches and the end of all pipes and conduit shall be kept sealed and lines left clean and unobstructed during construction.
- B. Existing utility lines uncovered during excavation shall be protected from damage during excavation and backfilling

3.6 PIPE INSTALLATION

- A. The u-bend pipe ends shall be sealed with fusion caps or tape prior to insertion into the borehole. Reasonable care shall be taken to ensure that the geothermal well field pipe is

not crushed, kinked, or cut. Should any pipe be damaged, the damaged section shall be cut out and the pipe reconnected by heat fusion.

- B. The vertical heat exchangers shall be connected as indicated on the plans. No variations can be made in the circuit hookup or the pipe sizes that are indicated without approval from the design engineer. The minimum bend radius for each pipe size shall be 25 times the nominal pipe diameter or the pipe manufacturer's recommendations, whichever is greater. The depth of all headers and supply and return piping is indicated on the plans and must be maintained.
- C. Circuits shall be pressure tested before any backfilling of the header trenches is executed. The individual circuits shall be pressure tested with water at 60 psi; however, not to exceed DR 11 pipe working pressure at bottom of the u-bend pipe.

END OF SECTION 23 57 33

SECTION 23 81 46 - WATER-SOURCE UNITARY HEAT PUMPS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Test and rate water-source heat pumps according to ARI 320. Provide ARI certification.
- C. Comply with ASHRAE 15.
- D. Comply with minimum COP/efficiency levels according to ASHRAE/IESNA 90.1.
- E. Comply with safety requirements of UL 484 and UL 559.
- F. Warranties: Submit a written warranty, signed by the manufacturer, agreeing to repair or replace components that fail within ten years after Substantial Completion.

PART 2 - PRODUCTS

2.1 CONCEALED HORIZONTAL AND VERTICAL WATER SOURCE HEAT PUMPS

- A. Description: Factory-assembled and -tested, packaged water-source heat pumps consisting of cabinet; sealed refrigerant circuit including compressor, refrigerant to water heat exchanger, refrigerant to air heat exchanger, and reversing valve; evaporator fans; refrigeration and temperature controls; filters; dampers; and isolation valves to allow servicing of components in refrigeration circuit.
 - 1. AC-1:
 - a. WaterFurnace Envision
 - b. ClimateMaster Tranquility TL Series
 - c. A product of equal specification
 - 2. Filters: Glass-fiber throwaway type, 1/2 inch thick, located in return-air stream.
 - 3. Dampers: Motorized, outside-air dampers that open when unit is energized with a manual-override switch.

2.2 FACTORY FINISHES

- A. Finish: Manufacturer's standard prime-coat finish ready for field painting.

2.3 REFRIGERANT PIPING

- A. Drawn-temper, Type ACR copper tube with wrought-copper fittings and brazed joints. Insulate refrigerant piping with 3/8-inch- thick, flexible elastomeric insulation.
- B. Insulation Fire-Resistance Test Characteristics: 25 flame-spread index and 50 smoke-developed index according to ASTM E 84.

2.4 CONTROLS

- A. Unit Controls: Manufacturer's standard electromechanical, factory-mounted and wired controls, including fan, reversing-valve, heat-and-cool-function controls. Provide accessory or standard control for hot water coil on unit.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Connect supply and return piping to heat pump with unions and shutoff valves.
- B. Connect heat-pump drain pan to nearest indirect waste connection, or as indicated.
- C. Connect supply and return ducts to heat pumps with flexible duct connections. Transition ducts to match unit duct-connection size.
- D. Install electrical devices furnished by manufacturer, but not specified to be factory mounted.
- E. Replace filters used during construction.

END OF SECTION - 23 81 46

SECTION 23 82 19 - FAN-COIL UNITS

PART 4 - GENERAL

4.1 SECTION REQUIREMENTS

- A. Submittals: Product Data, including color charts for cabinet finishes.
- B. Comply with ARI 440.
- C. Comply with ASHRAE 33.

PART 5 - PRODUCTS

5.1 FIELD-ASSEMBLED UNITS

- A. Products:
 - 1. Trane; UNT-IM-1, with 14,700 BTUH output
- B. Arrangement:
 - 1. Horizontal Units: An assembly including cabinet, filter, chassis, coil, fan, and motor in blow-through configuration with hydronic heating coil.
- C. Cabinet Finish: Phosphatized, primed, and coated with baked-enamel finish in color selected by Architect.
- D. Accessories:
 - 1. Steel sub base, height as indicated.
 - 2. Plastic motor-oiler tubes extending to beneath top of discharge grille.
 - 3. Steel recessing flanges for recessing fan-coil units into ceiling or wall.
 - 4. Filters: 1-inch- thick, throwaway filters in fiberboard frames.
- E. Control Systems:
 - 1. Two-Pipe, Valve Cycle: Wall-mounted thermostat, with manual fan-speed switch, cycles normally closed electric valve.

PART 6 - EXECUTION

6.1 INSTALLATION

- A. Install units level and plumb and firmly anchored.
- B. Connect to supply and return piping with shutoff valve and union at each connection.
- C. Connect units to wiring systems and to ground.

END OF SECTION - 23 82 19

SECTION 26 05 00 – COMMON WORK RESULTS FOR ELECTRICAL

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS

2.1 SUPPORTING DEVICES

- A. Material: Cold-formed steel, with corrosion-resistant coating acceptable to authorities having jurisdiction.
- B. Raceway and Cable Supports: Manufactured clevis hangers, riser clamps, straps, threaded C-clamps with retainers, ceiling trapeze hangers, wall brackets, and spring-steel clamps or click-type hangers.
- C. Cable Supports for Vertical Conduit: Factory-fabricated assembly consisting of threaded body and insulating wedging plug for non-armored electrical cables in riser conduits. Plugs have number and size of conductor gripping holes as required to suit individual risers. Body constructed of malleable-iron casting with hot-dip galvanized finish.
- D. Toggle Bolts: All-steel springhead type.

PART 3 - EXECUTION

3.1 ELECTRICAL EQUIPMENT INSTALLATION

- A. Headroom Maintenance: If mounting heights or other location criteria are not indicated, arrange and install components and equipment to provide maximum possible headroom.
- B. Materials and Components: Install level, plumb, and parallel and perpendicular to other building systems and components, unless otherwise indicated.
- C. Equipment: Install to facilitate service, maintenance, and repair or replacement of components. Connect for ease of disconnecting, with minimum interference with other installations.
- D. Right of Way: Give to raceways and piping systems installed at a required slope.

3.2 SUPPORT INSTALLATION

- A. Secure electrical items and their supports to building structure, using the following methods unless other fastening methods are indicated:
 - 1. Masonry: Toggle bolts on hollow block and expansion bolts on solid block. Seal around sleeves with mortar, both sides of wall.
 - 2. Structural Steel: Welded threaded studs or Spring-tension clamps.
 - 3. Light Steel Framing: Sheet metal screws.
 - 4. Fasteners for Damp, Wet, or Weather-Exposed Locations: Stainless steel.
 - 5. Light Steel: Sheet metal screws.
- B. Fasteners: Select so load applied to each fastener does not exceed 25 percent of its proof-test load.

3.3 FIRESTOPPING

- A. Apply firestopping to cable and raceway sleeves and other penetrations of fire-rated floor and wall assemblies to restore original undisturbed fire-resistance ratings of assemblies.

3.4 DEMOLITION

- A. Protect existing electrical equipment and installations indicated to remain. If damaged or disturbed in the course of the Work, remove damaged portions and install new products of equal capacity, quality, and functionality.
- B. Accessible Work: Remove exposed electrical equipment and installations, indicated to be demolished, in their entirety.
- C. Abandoned Work: Cut and remove buried raceway and wiring, indicated to be abandoned in place, 2 inches below the surface of adjacent construction. Cap raceways and patch surface to match existing finish.
- D. Remove, store, clean, reinstall, reconnect, and make operational components indicated for relocation.

3.5 PATCHING

- A. Repair, refinish and touch up disturbed finish materials and other surfaces to match adjacent undisturbed surfaces.

END OF SECTION - 26 05 00

SECTION 26 24 16 - PANELBOARDS

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Comply with NEMA PB 1.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 PANELBOARDS AND LOAD CENTERS

- A. Flush and Surface mounted, NEMA PB 1, Type 1.
 - 1. Front: Hinged to box with standard door within hinged cover.
 - 2. Doors: With concealed hinges, flush catches, and tumbler locks, all keyed alike.
 - 3. Bus: Hard-drawn copper, 98 percent conductivity.
 - 4. Main and Neutral Lugs: Mechanical type suitable for use with conductor material.
 - 5. Equipment Ground Bus: Adequate for feeder and branch-circuit equipment ground conductors; bonded to box.
 - 6. Feed-through Lugs: Mechanical type suitable for use with conductor material. Locate at opposite end of bus from incoming lugs or main device.
- B. Panelboard Short-Circuit Rating: UL label indicating series-connected rating with integral or remote upstream devices. Include size and type of upstream device allowable, branch devices allowable, and UL series-connected short-circuit rating.
- C. Load Centers:
 - 1. Overcurrent Protective Devices: Plug-in, full-module circuit breaker.
 - 2. Conductor Connectors: Mechanical type for main, neutral, and ground lugs and buses.
- D. Lighting and Appliance Branch-Circuit Panelboards:
 - 1. Branch Overcurrent Protective Devices: Bolt-on circuit breakers, replaceable without disturbing adjacent units.
 - 2. Doors: Front mounted with concealed hinges; secured with flush latch with tumbler lock; keyed alike.

- E. Distribution Panelboards:
 - 1. Doors: Front mounted, except omit in fused-switch panelboards; secured with vault-type latch with tumbler lock; keyed alike.
 - 2. Main Overcurrent Protective Devices: Circuit breaker.
 - 3. Branch overcurrent protective devices shall be one of the following:
 - a. For Circuit-Breaker Frame Sizes 125 A and Smaller: Bolt-on circuit breakers.
 - b. For Circuit-Breaker Frame Sizes Larger Than 125 A: Bolt-on circuit breakers; plug-in circuit breakers where individual positive-locking device requires mechanical release for removal.
 - c. Fused switches.
- F. Molded-Case Circuit Breakers: NEMA AB 1, bolt-on type. Single handle for multiple circuit breakers. Appropriate for application, including Type SWD for repetitive switching lighting loads and Type HACR for heating, air-conditioning, and refrigerating equipment.
- G. Fused Switches: NEMA KS 1, Type HD, with rejection clips to accommodate indicated fuses, handle lockable.
- H. Motor Controllers: NEMA ICS 2, Class A combination controllers.
- I. Contactors: NEMA ICS 2, Class A combination contactors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install panelboards and accessory items according to NEMA PB 1.1. Indicate installed circuit loads on a typed circuit directory after balancing panelboard loads.
- B. Mounting Heights: Top of trim 74 inches above finished floor, unless otherwise indicated.
- C. Future Circuit Provisions at Flush Panelboards: Stub four empty 3/4-inch conduits from panelboard into accessible or designated ceiling space.
- D. Wiring in Panelboard Gutters: Arrange conductors into groups bundle and wrap with wire ties.
- E. Tighten electrical connectors and terminals, including grounding connections, according to manufacturer's published torque-tightening values. Where manufacturer's torque values are not indicated, use those specified in UL 486A and UL 486B.
- F. Perform visual and mechanical inspections and electrical tests stated in NETA ATS.

END OF SECTION - 26 24 16

SECTION 26 27 26 - WIRING DEVICES

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data.
- B. Comply with NEMA WD 1.
- C. Comply with NFPA 70.

PART 2 - PRODUCTS

2.1 DEVICES

- A. General: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- B. Color: Ivory.
- C. Receptacles: General-Duty grade, NEMA WD 1, NEMA WD 6, and UL 498.
- D. Ground-Fault Circuit Interrupter Receptacles: Non-feed-through type, with integral duplex receptacle; for installation in a 2-3/4-inch- deep outlet box without an adapter.
- E. Snap Switches: General-duty, quiet type.
- F. Wall Plates, Finished Areas: Satin-finish stainless steel, fastened with metal screws having heads matching plate color.
- G. Wall Plates, Unfinished Areas: Galvanized steel with metal screws.
- H. Motion Sensors: General-Duty grade, Ceiling mounted
 - 1. Products:
 - a. WattStopper UT-300 Series
 - b. Leviton OSC20-RMW
 - c. A product of equal specification

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install devices and assemblies plumb and secure.
- B. Mount devices flush, with long dimension vertical, and grounding terminal of receptacles on top, unless otherwise indicated. Group adjacent devices under single, multigang wall plates.
- C. Protect devices and assemblies during painting.
- D. Install wall plates when painting is complete.

END OF SECTION - 26 27 26

SECTION 26 28 16 - ENCLOSED SWITCHES AND CIRCUIT BREAKERS

PART 1 - GENERAL (Not Applicable)

PART 2 - PRODUCTS

2.1 SWITCHES

- A. Enclosed, Nonfusible Switch: NEMA KS 1, Type HD, with lockable handle.

2.2 CIRCUIT BREAKERS

- A. Enclosed, Molded-Case Circuit Breaker: NEMA AB 1, with lockable handle, standard frame sizes, trip ratings, and number of poles [and thermal-magnetic trip, unless otherwise indicated].
 - 1. Lugs: Mechanical style suitable for number, size, trip ratings, and material of conductors.
 - 2. Application Listing: Appropriate for application; Type SWD for switching fluorescent lighting loads; Type HACR for heating, air-conditioning, and refrigerating equipment.
 - 3. Ground-Fault Protection: Remote-mounted relay and trip unit with adjustable pickup and time-delay settings, push-to-test feature, and ground-fault indicator.
 - 4. Communication Capability: Universal-mounted communication module with functions and features compatible with power monitoring and control system.
 - 5. Shunt Trip: 120-V trip coil energized from separate circuit, set to trip at 75 percent of rated voltage.
 - 6. Under voltage Trip: Set to operate at 35 to 75 percent of rated voltage without intentional time delay.
 - 7. Auxiliary Switch: One SPDT switch with "a" and "b" contacts; "a" contacts mimic circuit-breaker contacts, "b" contacts operate in reverse of circuit-breaker contacts.

PART 3 - EXECUTION

3.1 TESTING

- A. Perform visual and mechanical inspections and electrical tests stated in NETA ATS.

END OF SECTION - 26 28 16

SECTION 26 50 00 - LIGHTING

PART 1 - GENERAL

1.1 SECTION REQUIREMENTS

- A. Submittals: Product Data for each luminaire, including lamps.
- B. Fixtures, Emergency Lighting Units, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.
- C. Coordinate ceiling-mounted luminaires with ceiling construction, mechanical work, and security and fire-prevention features mounted in ceiling space and on ceiling.

PART 2 - PRODUCTS

2.1 LUMINAIRES

- A. Fixture A
 - 1. Product:
 - a. Existing Fluorescent Lights.
 - 2. Voltage: 120-Vac.
 - 3. Mounting: Semi recessed ceiling.
 - 4. Nominal Dimensions: 12" (305mm) x 48" (1219mm).
 - 5. Lamps: Two (2) T-8 fluorescent.
 - 6. Ballast Types and Features: Electronic.
 - 7. Lens: Acrylic rounded lens
 - 8. External Finish: Painted blue enamel
 - 9. Trim and Hardware: Ivory trim.
 - 10. Other Requirements: Fixtures are considered 'Historic' and need to not be damaged.
- B. Fixture B
 - 1. Product:
 - a. Existing Can Light
 - 2. Voltage: 120-V ac.
 - 3. Mounting: Recessed ceiling.
 - 4. Nominal Dimensions: 7" (178mm) Diameter.

5. Lamps: 1 10W, A-19, 800 Lumens LED.
6. Ballast Types and Features: Integrated ballast.
7. Lens: None.
8. External Finish: Steel.
9. Trim and Hardware: Polished Aluminum trim

C. Fixture C

1. Product:
 - a. 1 X 1 Recessed Interior Fixture
2. Voltage: 120-Vac.
3. Mounting: Semi-recessed ceiling.
4. Nominal Dimensions: 12" x 12"
5. Lamps: 23 Watt T-3 CFL - fluorescent.
6. Ballast Types and Features: Electronic.
7. Lens: Acrylic rounded lens
8. External Finish: Painted enamel
9. Trim and Hardware: Painted trim.
10. Other Requirements: Fixtures are considered 'Historic' and need to not be damaged.

D. Fixture D

1. Product:
 - a. 1 X 1 Recessed Exterior Fixture
2. Voltage: 120-Vac.
3. Mounting: Semi-recessed ceiling.
4. Nominal Dimensions: 12" x 12"
5. Lamps: 23 Watt T-3 CFL - fluorescent.
6. Ballast Types and Features: Electronic.
7. Lens: Acrylic rounded lens
8. External Finish: Painted enamel
9. Trim and Hardware: Painted trim.
10. Other Requirements: Fixtures are considered 'Historic' and need to not be damaged.

E. Fixture F

1. Product:
 - a. Pendant Fixture.
2. Voltage: 120-Vac.
3. Mounting: Pendant

4. Nominal Dimensions: 24" diameter
5. Lamps: 40 Watt CFL
6. Ballast Types and Features: Electronic.
7. Lens: None
8. External Finish: Painted enamel
9. Trim and Hardware: Metal trim.
10. Other Requirements: Fixtures are considered 'Historic' and need to not be damaged.

F. Fixture F

1. Product:
 - a. Existing Wall packs.
2. Voltage: 120-Vac.
3. Mounting: Wall mounted.
4. Nominal Dimensions: 7" width
5. Lamps: CFL - fluorescent.
6. Ballast Types and Features: Electronic.
7. Lens: Acrylic rounded lens
8. External Finish: Anodized
9. Trim and Hardware: None
10. Other Requirements: Fixtures are considered 'Historic' and need to not be damaged.

G. Fixture G

1. Product:
 - a. Existing Exterior Wall Mounted Light Fixture.
2. Voltage: 120-Vac.
3. Mounting: Wall Mounted
4. Nominal Dimensions: 12"
5. Lamps: Unknown, replace with like ballast and lamps
6. Ballast Types and Features: Electronic.
7. Lens: Acrylic rounded lens
8. External Finish: Painted
9. Trim and Hardware: None
10. Other Requirements: Fixtures are considered 'Historic' and need to not be damaged.

H. Fixture H

1. Product
 - a. Existing Can Light

2. Voltage: 120-V ac.
3. Mounting: Recessed ceiling.
4. Nominal Dimensions: 7" (178mm) Diameter.
5. Lamps: 1 10W, A-19, 800 Lumens LED.
6. Ballast Types and Features: Integrated ballast.
7. Lens: None.
8. External Finish: Steel.
9. Trim and Hardware: Polished Aluminum trim

I. Fixture J

1. Product:
 - a. Lithonia, WP-2-32
 - b. Williams, AIW-2 32
 - c. Product of equal specification
2. Voltage: 120-V ac.
3. Mounting: Surface wall, 8' (2.44m).
4. Nominal Dimensions: 48" (12192mm) x 7-3/16" (1826mm) x 3-1/4" (826mm).
5. Lamps: Two (2) 48" T-8 fluorescent.
6. Ballast Types and Features: Electronic.
7. Lens: Acrylic lensed on the front and bottom.
8. External Finish: Five-stage, iron-phosphate pretreatment with high-gloss, high-reflectivity baked white polyester paint after fabrication.

2.2 FLUORESCENT LAMP BALLASTS

- A. Description: Include the following features, unless otherwise indicated:
 1. Designed for type and quantity of lamps indicated at full light output.
 2. Externally fused with slow-blow type rated between 2.65 and 3.0 times the line current.
- B. Electronic ballasts for linear lamps shall include the following features, unless otherwise indicated:
 1. Comply with NEMA C82.11.
 2. Ballast Type: Rapid start, unless otherwise indicated.
 3. Programmed Start: Ballasts with two-step lamp starting to extend life of frequently started lamps.
 4. Total harmonic distortion rating of less than 10 percent according to NEMA C82.11.
 5. Transient Voltage Protection: IEEE C62.41, Category A.
 6. Operating Frequency: 60 kHz or higher.

7. Lamp Current Crest Factor: Less than 1.7.
8. Parallel Lamp Circuits: Multiple lamp ballasts connected to maintain full light output on surviving lamps if one or more lamps fail.

2.3 FLUORESCENT LAMPS

- A. Low-Mercury Lamps: Comply with Federal toxic characteristic leaching procedure test, and yield less than 0.2 mg of mercury per liter, when tested according to NEMA LL 1.
- B. T8 rapid-start low-mercury lamps, rated 32 W maximum, 2800 initial lumens (minimum), CRI of 80 (minimum), color temperature of 3500K, and average rated life of 20,000 hours, unless otherwise indicated.

2.4 LED LAMPS

- A. A19 bulb, rated 10 W, 800 initial lumens, CRI of 70 (minimum) and color temperature of 3500K.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set units level, plumb, and square with ceiling and walls, and secure.
- B. Lamping: Where specific lamp designations are not indicated, lamp units according to manufacturer's written instructions.

END OF SECTION - 26 50 00

9/18/2009; revised 6/29/15*

City Manager
City of Lawrence
PO Box 708
Lawrence, Kansas 66044

Subject Notice of Lead-Based Paint Inspection (NOTICE)
413 E. 7th Street, Lawrence, KS 66044

Please find enclosed the Lead-Based Paint Inspection report for the commercial property located at **413 E. 7th Street, Lawrence, KS 66044**. The Inspection was conducted in accordance with HUD guidelines (24 CFR 35.1320 [b]) and HUD's *Guidelines for the Evaluation and Control of Lead-Based Paint in Housing* (June 1995), Chapter 7 (June 1977) and any applicable and State of KS Guidelines. This NOTICE has been generated in conjunction with HUD Guidelines 24 CFR 35.125. Michelle Nelson a licensed Lead Hazard Risk Assessor (KS Certification #KS05-4153) with Hernly Associates, Inc. (Firm License #KS00-1030) performed the Inspection for the above referenced site on 9/16/2009 using an RMD LPA-1 x-ray fluorescence (XRF) lead paint analyzer (Serial #1696).

Inspections consists of a visual examination of properties and a surface-by-surface examination of surface coatings (e.g., paint, stain, varnish, shellac, polyurethane, etc.) on immediately available and easily accessible interior and exterior trim components and other surfaces of buildings which are located on inspected properties.

Hernly Associates, Inc. has identified that *lead-based paint (LBP) is present on the exterior metal siding, columns & C wall garage door face, on the interior baggage room C wall garage door face & A wall garage door casing, and the interior waiting lounge air handling unit*. A complete list of tested components and their locations can be found within the produced *Lead-Based Paint Inspection Report*. A complete copy of the report is enclosed with this Notice or can be viewed at the offices of the City of Lawrence-City Hall, PO Box 708, Lawrence, Kansas 66044. If you would like further information on the Inspection of this property or on lead hazards and their health effects, please contact the City Manager at (785) 832-3400 or me at (785) 218-2552.

***Please note: This 2009 inspection report has been amended as of 6/29/2015 to include Appendix D - LBP Scope of Renovation Work/Procedures under Hernly Environmental, Inc.**

Sincerely,



Michelle Nelson
Project Manager

LEAD -BASED PAINT INSPECTION REPORT



Santa Fe Station
413 E. 7th Street
Lawrence, KS 66044

PREPARED FOR:

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City of Lawrence-City Hall
PO Box 708
Lawrence, Kansas 66044
(785) 832-3400

**OWNER-TENANT-
REPRESENTATIVE:**

City Manager
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9/18/2009

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**ENVIRONMENTAL CONSULTANT:
 HERNLY ASSOCIATES, INC.**

PROJECT CONTACT: Michelle Nelson 9/18/2009
Name Date

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PART I: EXECUTIVE SUMMARY

IDENTIFYING INFORMATION

A Lead-Based Paint (LBP) Inspection (Inspection) was conducted at 413 E. 7th Street in Lawrence, KS 66044 for the City Manager, Lawrence, Kansas 66044 (785) 832-3400 on 9/16/2009. Michelle Nelson, a Certified Risk Assessor (KS License No. KS05-4153), conducted the Inspection. It should be noted that based upon conversations with the Owner and/or client, and to the knowledge of this Assessor, there has/has not been any previous LBP testing at this property. Further information concerning this structure can be obtained from the Owner and/or Client.

This Inspection consisted of a visual examination of the indicated property and a surface-by-surface examination of surface coatings (e.g., paint, stain, varnish, shellac, polyurethane, etc.) on immediately available and easily accessible interior and exterior trim components and other surfaces of buildings which are located on inspected properties. Testing was accomplished using an x-ray fluorescence (XRF) lead-in-paint analyzer. The Inspection was conducted in accordance with HUD guidelines (24 CFR 35.1320 [b]) and HUD's Guidelines for the Evaluation and Control of Lead-Based Paint in Housing (June 1995), Chapter 7 (June 1977) and applicable and State of KS Guidelines. The results of the Inspection are summarized below.

SUMMARY OF RESULTS

Location & Type of Identified Lead-Based Paint

As a result of the LBP Inspection which was conducted on 9/16/2009, it was found that lead-based paint (LBP) is present at some locations tested on the subject property as of the date of the Inspection. The analytical results from this effort identified that the following components and surfaces are coated with LBP, as defined in the 1988 Section 302 Amendment to the Lead-Based Paint Poisoning Prevention Act, by Title X of the 1992 Housing and Community Development Act, any enacted addendums to this rule, and/or State of Kansas standards.

SUMMARY REPORT OF LEAD PAINT INSPECTION FOR: Santa Fe Station-Lawrence, KS

Inspection Date: 09/16/09
Report Date: 9/16/2009
Abatement Level: 1.0
Report No. S#1696 - 09/16/09 10:49
Total Readings: 210 Actionable: 7
Job Started: 09/16/09 10:49
Job Finished: 09/16/09 14:09

Read No.	Wall	Structure	Location	Member	Paint Cond	Paint Substrate	Paint Color	Lead (mg/cm ²)	Mode
Exterior Room 001 Station									

Lead-Based Paint Inspection Report

Santa Fe Station
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172	A	Siding	Lft		P	Metal	White	1.0	QM
186	B	Column	Ctr		P	Metal	Tan	1.0	QM
201	C	Garage door	Lft	Face	P	Wood	Tan	2.2	QM
190	C	Column	Rgt		P	Metal	Tan	1.0	QM

Interior Room 001 Baggage Room

026	A	Garage door	Lft	Casing	F	Wood	Cream	1.7	QM
025	C	Garage door	Ctr	Face	F	Wood	Cream	2.5	QM

Interior Room 014 Waiting Lounge

170	D	Air Handling Unit	Rgt		F	Metal	Tan	2.0	QM
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Calibration Readings

---- End of Readings ----

DISCLOSURE REGULATIONS

A copy of this complete report must be made available to new lessees (tenants) and/or must be provided to purchasers of this property under Federal law before they become obligated under any future lease or sales contract transactions (Section 1018 of Title X – found in 24 CFR Part 35 and 40 CFR Part 745), until the demolition of this property. Landlords and/or sellers are also required to distribute an educational pamphlet developed by the EPA entitled “*Protect Your Family From Lead in Your Home*” and include standard warning language in their leases or sales contracts to ensure that parents have the information they need to protect their children, as well as to ensure that all persons can be protected, from LBP hazards.

FUTURE REMODELING PRECAUTIONS

It should be noted that during this Inspection, a limited number of very specific areas were tested for the presence of LBP. All lead-based paint which was identified by the XRF analyzer is detailed in this report. Because of the age of this structure, additional Inspections and/or lead hazard risk assessments should occur at any and all specifically untested areas, prior to the conduct of any future activities that may in any way impact a substrate, surface, component, and/or surface coating. Dust and/or soil sample collection and analysis should follow any hazard control activity, repair, remodeling, or renovation effort, and any other work efforts that may in any way disturb known or assumed LBP and/or any lead containing materials. These Testing activities will help the Owner and all Contractors to protect the health and safety of the occupants, the Workers and the neighborhood. Details concerning lead safe work techniques and approved hazard control methods can be found in the HUD publication entitled: “*Guidelines for the Evaluation and Control of LBP Hazards in Housing*” (June 1995 & 1997 Revision).

CONDITIONS & LIMITATIONS

Hernly Associates, Inc. (HERNLY) and the applicable personnel have performed the Client requested tasks listed above in a thorough and professional manner consistent with commonly accepted standard industry practices, using state of the art practices and best available known technology, as of the date of

the testing. HERNLY cannot guarantee and does not warrant that this Testing has identified all lead-based paint (LBP) and/or LBP Hazards which may have been present on the property as of the date of the Testing. Due to our narrow scope of work, HERNLY also cannot and will not guarantee that any/all other possible adverse environmental factors and/or conditions affecting the subject property were identified on the date of the Testing. It is not at all or in any way possible to test every part of every interior or exterior surface of any property or structure to identify all LBP or LBP Hazards. This is why federal and state agency protocols and standard industry practices dictate that components and/or substrate types are grouped together based upon generally accepted factors of homogeneity (e.g., Owner supplied data, color, appearance, apparent functional uses, etc.). HERNLY cannot and will not warrant that the Testing that was requested by the Client and/or Owner will satisfy the dictates of, or provide a legal defense in connection with, any environmental laws or regulations. It is the responsibility of the Client and/or Owner to know and abide by all applicable laws, regulations, and standards.

The results reported and conclusions reached by HERNLY are solely for the benefit of the above named Client. The results and opinions in this report, based solely upon the analytical results provided to HERNLY, as well as the conditions found on the property as of the date of the Testing, will be valid only as of the date of the Testing. HERNLY assumes no responsibility and has no obligation to advise the Client of any changes in any real or potential lead hazards at this residence that may or may not be later brought to our attention. Further conditions and limitations to this contracted report are included in the general terms and conditions supplied to the Client with the contract for services.

Please remember that based upon standard industry practices and federal/state protocols, lead-based paint testing, as well as dust lead testing and soil lead testing, occurred at a very limited number of locations in the structure; LBP, LBP Hazards and/or Lead-Containing Materials (LCM) could still be present in the unit at any and all areas not specifically tested as part of this Testing effort. Great care should be taken by the Client and Contractor if, at a later date, any repair, repainting, maintenance, remodeling, landscaping, or renovation activities, or any similar types of activities, disturb any dust, soil, paint, component, and/or substrate where the concentrations of lead are not specifically and empirically known. In lieu of any additional testing, all surfaces, components, substrates, dusts, soils, and Paint should be assumed to contain hazardous and dangerous levels of lead.

It should also be noted that concentrations of lead which are identified in surface coatings, dust and/or soil, which are less than the guideline and/or statutory levels, does not mean that there is not a real potential for human health risks. Instances of higher than normal blood lead level concentrations have been reported in individuals who occupy structures where LBP and/or LBP Hazards (as indicated by State and Federal definition) were not identified.

PART II: SITE & FIELD TESTING INFORMATION**BUILDING CONDITION SURVEY**

Date of Construction:	1950's
Building Use:	Commercial
Setting:	Mixed Purpose Neighborhood
Front Entry Faces:	Southwest
Interior Wall & Trim Materials:	Plaster/drywall/CMU block with wood trim
Window Construction:	Wood/Metal
Siding Material:	Brick/Metal
Lot Type:	Flat
Overall Building/Site Condition:	Appears to be Good

PAINT CONDITION INFORMATION

EPA and HUD have also provided specific definitions for the terms *intact*, *deteriorated greater than de minimis levels*, and *deteriorated less than de minimis levels* when these terms are used to describe surface coating conditions. These definitions are most typically associated with surface conditions only. Usage of these terms in describing conditions other than those associated with surface coatings are not known to be defined by EPA or HUD. Lead concentrations that meet or exceed the HUD published levels (e. g., greater than or equal to 1.0 milligrams per centimeter square [$\geq 1.0 \text{ mg/cm}^2$]) are identified as being potentially dangerous. To aid in the interpretation of the paint condition information, please refer to the following HUD definitions and criteria for specific interior and exterior surfaces.

EPA/HUD Definitions for *Intact*, *Fair*, and *Poor* Paint Conditions

Building Component(s)	Intact	Deteriorated (less than) < de minimis levels	Deteriorated (greater than) > de minimis levels
Exterior components with large surface areas (siding, etc)	Entire surface is Intact	Deteriorated paint is observed at less than or equal to 20 square feet (S.F.) of component	Deteriorated paint at more than 20 S.F. of component
Interior components with large surface areas (walls, ceilings, etc.)	Entire surface is Intact	Deteriorated paint is observed at less than or equal to 2 S.F. of component	Deteriorated paint at more than 2 S.F. of component
Int. & Ext. components w/ small surface areas (Soffits, baseboards, etc.)	Entire surface is Intact	Deteriorated paint is observed at less than or equal to 10% of the total surface area of component	Deteriorated paint at more than 10% of the total surface area of the component

PAINT INSPECTION RESULTS

A Lead-Based Paint Inspection conforming to HUD guidelines (24 CFR 35.1320[a]), EPA regulations (40 CFR 745.227[b]), and HUD's Guidelines for the Evaluation and Control of Lead-Based Paint in Housing (June 1995), Chapter 7 (revised 1977), was accomplished at the above indicated property on immediately available and accessible interior and exterior surfaces and components. On 9/16/2009 a total of 210 tests (assays) were taken at all listed testing combinations, using an x-ray fluorescence analyzer (XRF). Lead concentrations that meet or exceed the HUD published levels identified as being potentially dangerous (e. g., greater than or equal to 1.0 milligrams per centimeter square [$\geq 1.0 \text{ mg/cm}^2$]) were encountered on the components and locations listed below:

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 Report Date: 9/16/2009
 Abatement Level: 1.0
 Report No. S#1696 - 09/16/09 10:49
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Read No.	Wall	Structure	Location	Member	Paint Cond	Substrate	Paint Color	Lead (mg/cm ²)	Mode
Exterior Room 001 Station									
172	A	Siding	Lft		P	Metal	White	1.0	QM
186	B	Column	Ctr		P	Metal	Tan	1.0	QM
201	C	Garage door	Lft	Face	P	Wood	Tan	2.2	QM
190	C	Column	Rgt		P	Metal	Tan	1.0	QM
Interior Room 001 Baggage Room									
026	A	Garage door	Lft	Casing	F	Wood	Cream	1.7	QM
025	C	Garage door	Ctr	Face	F	Wood	Cream	2.5	QM
Interior Room 014 Waiting Lounge									
170	D	Air Handling Unit	Rgt		F	Metal	Tan	2.0	QM

Calibration Readings

---- End of Readings ----

Some of the test locations exhibited levels of lead-in-paint below HUD's definition of LBP, but in great enough quantities to be detected by the XRF analyzer. It should be noted that lead concentrations (in paint) that are less than the levels that identify a surface coating as LBP still have the potential of causing lead poisoning. Should these or any potential LBP painted components and/or surfaces be disturbed in any manner that generates dust, debris, and fumes/vapors, extreme care must be taken to eliminate the spread of all dusts, debris, and fumes/vapors. Because of the age of the structure, it should be assumed that any and all painted surfaces, components, or surfaces not specifically tested as part of this investigation, or any previous investigations, are coated with LBP, and that any renovation and all repair activities in these areas dictate the use of safe work practices which limit dust generation and area contamination.

Testing was performed by Michelle Nelson, a State of Kansas certified Risk Assessor, using the Radiation Monitoring Device (RMD) LPA-1 X-ray Fluorescence analyzer (1696, State of Kansas License #22-B804, State of Missouri Registration #IRM-136). Please refer to *Appendix A - XRF Lead-In-Paint Analytical Data* for a sequential and detailed (room-by-room) analytical report.

Please remember that lead-based paint testing occurred at a limited number of specific locations in the structure; LBP and/or lead containing materials (LCM) could still be present in the unit at areas not specifically tested as part of this Inspection regime. Great care should be taken by the Client or any Contractors if, at a later date, any repair, maintenance, remodeling, or renovation activities disturb any surface coating where the concentrations of lead are not specifically known. In lieu of any additional testing, all surfaces and surface coatings should be assumed to contain hazardous and dangerous levels of lead.

APPENDIX A
XRF LEAD-IN-PAINT ANALYTICAL DATA

PLEASE NOTE: The paint inspection table listed below is generated by computer software that is created and supplied by the XRF device manufacturer. In their software, designations of intact, fair and poor are used when describing the area of deteriorated paint. The XRF device manufacturer does not supply software that allows for a description of paint as intact or deteriorated. Nor does the manufacturer's software allow for a description of whether paint is at, above or below de minimis levels. In an effort to compensate for this manufacturer's software inability, please note the following:

Paint listed as intact (e.g., I) on the following XRF Report should be considered to be entirely free of deterioration.

Paint listed as fair (e.g., F) on the following XRF Report should be considered to be deteriorated in areas that are below de minimis levels.

Paint listed as poor (e.g., P) on the following XRF Report should be considered to be deteriorated in areas that are equal to or greater than the de minimis levels.

PLEASE NOTE: For convenience, a sequential and a detailed (room-by-room) list of testing locations and results are included with this report.

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SEQUENTIAL REPORT OF LEAD PAINT INSPECTION FOR: Santa Fe Station-Lawrence, KS

Inspection Date: 09/16/09
 Report Date: 9/16/2009
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 Report No. S#1696 - 09/16/09 10:49
 Total Readings: 210
 Job Started: 09/16/09 10:49
 Job Finished: 09/16/09 14:09

Read No.	Room Rm	Room Name	Wall	Structure	Location	Member	Paint Cond	Substrate	Paint Color	Lead (mg/cm ²)	Mode
1		CALIBRATION								1.1	TC
2		CALIBRATION								0.9	TC
3		CALIBRATION								1.0	TC
4		CALIBRATION								-0.1	TC
5		CALIBRATION								-0.1	TC
6		CALIBRATION								0.0	TC
7	001	Baggage Rm	A	Ceiling		Ctr	F	Drywall	Cream	0.3	QM
8	001	Baggage Rm	A	Wall		U Ctr	F	Drywall	Cream	-0.2	QM
9	001	Baggage Rm	A	Wall		L Ctr	F	CMU Block	Cream	-0.2	QM
10	001	Baggage Rm	B	Wall		W Rgt	F	CMU Block	Cream	-0.2	QM
11	001	Baggage Rm	B	Wall		W Lft	F	CMU Block	Brown	-0.3	QM
12	001	Baggage Rm	C	Wall		W Lft	F	CMU Block	Cream	-0.2	QM
13	001	Baggage Rm	D	Wall		W Ctr	F	CMU Block	Cream	-0.1	QM
14	001	Baggage Rm	B	Shelving		Ctr	F	Wood	Brown	-0.3	QM
15	001	Baggage Rm	B	Door		Lft	F	Metal	Silver	-0.1	QM
16	001	Baggage Rm	C	Door		Lft Casing	P	Metal	Tan	-0.1	QM
17	001	Baggage Rm	C	Door		Lft Jamb	P	Metal	Tan	-0.1	QM
18	001	Baggage Rm	C	Door		Lft Face	F	Metal	Tan	-0.1	QM
19	001	Baggage Rm	C	Floor		Lft	F	Concrete	Red	-0.4	QM
20	001	Baggage Rm	C	Shelving		Lft	F	Wood	Brown	-0.2	QM
21	001	Baggage Rm	C	Window		Lft	F	Metal	Silver	-0.4	QM
22	001	Baggage Rm	C	Window		Rgt	F	Metal	Silver	-0.3	QM
23	001	Baggage Rm	C	Garage door		Ctr Casing	F	Wood	Cream	0.5	QM
24	001	Baggage Rm	C	Garage door		Ctr Railing	F	Metal	Cream	0.0	QM
25	001	Baggage Rm	C	Garage door		Ctr Face	F	Wood	Cream	2.5	QM
26	001	Baggage Rm	A	Garage door		Lft Casing	F	Wood	Cream	1.7	QM
27	001	Baggage Rm	A	Vent		Ctr	F	Metal	Silver	-0.1	QM
28	001	Baggage Rm	A	Pipe		Ctr	F	Metal	Silver	-0.1	QM
29	001	Baggage Rm	A	Pipe		Ctr	F	Metal	Cream	-0.2	QM
30	001	Baggage Rm	A	PipeWrap		Ctr	F	N/A	Cream	-0.1	QM
31	002	FrOff/Vestib	A	Wall		W Ctr	F	Plaster	Cream	-0.2	QM
32	002	FrOff/Vestib	B	Wall		W Ctr	F	Plaster	Cream	0.0	QM
33	002	FrOff/Vestib	C	Wall		W Ctr	F	Plaster	Cream	-0.2	QM
34	002	FrOff/Vestib	D	Wall		W Ctr	F	Plaster	Cream	-0.2	QM
35	002	FrOff/Vestib	A	Baseboard		Ctr	F	Vinyl	Tan	-0.1	QM
36	002	FrOff/Vestib	A	Window		Ctr Casing	F	Wood	Cream	-0.1	QM
37	002	FrOff/Vestib	A	Window		Ctr Sash	F	Wood	Cream	-0.2	QM
38	002	FrOff/Vestib	A	Window		Ctr Sill	F	Wood	Cream	-0.1	QM
39	002	FrOff/Vestib	A	Window		Rgt Sill	F	Wood	Tan	-0.1	QM
40	002	FrOff/Vestib	A	Window		Rgt Casing	F	Wood	Tan	-0.2	QM
41	002	FrOff/Vestib	A	Door		Rgt Casing	F	Metal	Tan	0.1	QM
42	002	FrOff/Vestib	A	Door		Rgt Face	F	Metal	Tan	-0.3	QM
43	002	FrOff/Vestib	A	Counter		Rgt Frame	F	Wood	Cream	-0.2	QM
44	002	FrOff/Vestib	A	Counter		Rgt Ledge	F	Wood	Stained	-0.1	QM
45	002	FrOff/Vestib	B	Window		Lft Casing	F	Wood	Stained	-0.4	QM
46	002	FrOff/Vestib	B	Door		Ctr Casing	F	Metal	Tan	-0.2	QM
47	002	FrOff/Vestib	B	Door		Ctr Face	F	Wood	Stained	-0.4	QM
48	002	FrOff/Vestib	B	Door		Rgt Casing	F	Metal	Tan	-0.2	QM

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49	002	FrOff/Vestib	C	Closet		Ctr Wall	F Plaster	Cream	-0.1	QM
50	002	FrOff/Vestib	C	Closet		Ctr Shelf	F Wood	Cream	-0.1	QM
51	002	FrOff/Vestib	C	Closet		Ctr Shelf Sup.	F Wood	Cream	-0.1	QM
52	002	FrOff/Vestib	C	Closet		Ctr Door Casing	F Wood	Stained	-0.2	QM
53	002	FrOff/Vestib	C	Closet		Ctr Door Face	F Wood	Stained	-0.3	QM
54	002	FrOff/Vestib	C	Ceiling		Ctr	F Plaster	Cream	-0.3	QM
55	002	FrOff/Vestib	D	Window		Ctr Sash	F Metal	Silver	-0.8	QM
56	002	FrOff/Vestib	D	Window		Ctr Sill	F Wood	Stained	-0.1	QM
57	003	Hallway	A	Ceiling		Lft	F Plaster	Cream	-0.3	QM
58	003	Hallway	A	Wall		W Lft	F Wood	Stained	-0.3	QM
59	003	Hallway	B	Wall		W Lft	F Wood	Stained	-0.2	QM
60	003	Hallway	C	Wall		W Lft	F Wood	Stained	-0.1	QM
61	003	Hallway	D	Wall		W Lft	F Wood	Stained	-0.2	QM
62	003	Hallway	D	Baseboard		Ctr	F Vinyl	Tan	0.3	QM
63	003	Hallway	A	Door		Lft Casing	F Metal	Tan	-0.2	QM
64	003	Hallway	A	Door		Lft Face	F Wood	Stained	-0.4	QM
65	003	Hallway	A	Door		Ctr Face	F Wood	Stained	-0.3	QM
66	003	Hallway	A	Door		Ctr Casing	F Metal	Tan	-0.2	QM
67	003	Hallway	A	Door		Rgt Casing	F Metal	Tan	-0.1	QM
68	003	Hallway	A	Door		Rgt Face	F Wood	Stained	-0.2	QM
69	003	Hallway	A	Locker		Ctr	F Metal	Tan	-0.1	QM
70	003	Hallway	C	ElectricPane		Ctr	F Metal	Tan	-0.3	QM
71	003	Hallway	C	Door		Lft Casing	F Metal	Tan	-0.2	QM
72	003	Hallway	C	Door		Lft Face	F Wood	Stained	-0.3	QM
73	004	Mens Room	C	Ceiling		Ctr	F Drywall	Cream	-0.1	QM
74	004	Mens Room	A	Wall		W Ctr	F Tile	Factory	-0.4	QM
75	004	Mens Room	A	Window		Ctr Sash	F Metal	Silver	-0.4	QM
76	004	Mens Room	B	Stall		Lft Frame	F Metal	Tan	-0.1	QM
77	004	Mens Room	B	Stall		Lft Door Face	F Metal	Tan	-0.1	QM
78	004	Mens Room	D	Stall		Lft Door Face	F Metal	Black	-0.2	QM
79	004	Mens Room	C	Wall		W Lft	I Paneling	Factory	-0.1	QM
80	004	Mens Room	C	Door		Rgt Casing	F Metal	Tan	-0.3	QM
81	005	Janitor Cl.	C	Door		Rgt Casing	F Metal	Tan	-0.2	QM
82	005	Janitor Cl.	C	Door		Rgt Face	F Wood	Stained	-0.3	QM
83	005	Janitor Cl.	C	Shelving		Lft	F Wood	White	-0.2	QM
84	006	Ladies Room	C	Ceiling		Lft	P Drywall	Cream	-0.4	QM
85	006	Ladies Room	D	Wall		W Lft	I Paneling	Factory	-0.2	QM
86	006	Ladies Room	D	Wall		W Rgt	I Tile	Factory	-0.2	QM
87	006	Ladies Room	D	Stall		Rgt Frame	F Metal	Tan	-0.2	QM
88	006	Ladies Room	D	Stall		Rgt Door Face	F Metal	Tan	-0.2	QM
89	006	Ladies Room	A	Window		Rgt Sash	F Metal	Silver	-0.7	QM
90	006	Ladies Room	C	Door		Rgt Casing	F Metal	Tan	-0.2	QM
91	006	Ladies Room	C	Door		Rgt Face	F Wood	Stained	-0.4	QM
92	007	Boiler Room	C	Ceiling		Lft	F Plaster	White	-0.1	QM
93	007	Boiler Room	C	Wall		W Ctr	F CMU Block	Gray	0.0	QM
94	007	Boiler Room	D	Wall		W Ctr	F CMU Block	Gray	-0.1	QM
95	007	Boiler Room	A	Wall		W Ctr	F CMU Block	Gray	0.0	QM
96	007	Boiler Room	B	Wall		W Ctr	F CMU Block	Gray	-0.1	QM
97	007	Boiler Room	C	Door		Lft Casing	F Metal	Gray	-0.2	QM
98	007	Boiler Room	C	Door		Lft Face	F Metal	Gray	-0.2	QM
99	007	Boiler Room	C	Door		Rgt Face	F Metal	Gray	-0.1	QM
100	007	Boiler Room	C	Door		Rgt Casing	F Metal	Gray	-0.2	QM
101	007	Boiler Room	C	Door		Rgt Transom	F Metal	Gray	-0.3	QM
102	007	Boiler Room	A	Pipe		Ctr	F Metal	Yellow	-0.1	QM
103	007	Boiler Room	A	Pipe		Ctr	F Metal	White	0.3	QM
104	007	Boiler Room	A	FuseBox		Ctr	F Metal	Gray	-0.2	QM
105	007	Boiler Room	A	Elec.Box		Rgt	F Metal	Gray	-0.2	QM
106	007	Boiler Room	B	Pipe		Lft	F Metal	White	-0.3	QM
107	007	Boiler Room	B	Pipe		Rgt	P Metal	White	-0.2	QM
108	007	Boiler Room	B	Bracket		Ctr	P Metal	White	-0.1	QM
109	007	Boiler Room	D	Pipe		Lft	F Metal	White	-0.1	QM
110	008	AgentsOffic	A	Wall		W Ctr	F Plaster	Cream	-0.4	QM

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Lawrence, KS**

111	008	AgentsOffic	B	Wall	W	Ctr	F	Plaster	Cream	-0.5	QM
112	008	AgentsOffic	C	Wall	W	Ctr	F	Plaster	Cream	-0.4	QM
113	008	AgentsOffic	D	Wall	W	Ctr	F	Plaster	Cream	-0.2	QM
114	008	AgentsOffic	D	Baseboard		Ctr	F	Vinyl	Tan	0.0	QM
115	008	AgentsOffic	B	Closet		Rgt Wall	F	Plaster	Cream	-0.3	QM
116	008	AgentsOffic	B	Closet		Rgt Door Csg.	F	Wood	Stained	-0.1	QM
117	008	AgentsOffic	B	Closet		Rgt Door Face	F	Wood	Stained	-0.2	QM
118	008	AgentsOffic	A	Window		Rgt Sash	F	Metal	Silver	-0.5	QM
119	008	AgentsOffic	A	Window		Rgt Sill	F	Wood	Stained	-0.1	QM
120	008	AgentsOffic	C	Window		Ctr Casing	F	Wood	Stained	-0.3	QM
121	008	AgentsOffic	D	Window		Ctr Casing	F	Wood	Stained	-0.1	QM
122	008	AgentsOffic	D	Door		Lft Face	F	Wood	Stained	-0.2	QM
123	008	AgentsOffic	D	Door		Lft Casing	F	Metal	Tan	-0.2	QM
124	009	File Room	A	Ceiling		Ctr	F	Plaster	Cream	-0.1	QM
125	009	File Room	A	Wall	W	Ctr	F	CMU Block	Cream	-0.2	QM
126	009	File Room	B	Wall	W	Ctr	F	CMU Block	Cream	0.1	QM
127	009	File Room	C	Wall	W	Ctr	F	CMU Block	Cream	0.2	QM
128	009	File Room	D	Wall	W	Ctr	F	CMU Block	Cream	-0.2	QM
129	009	File Room	C	Window		Ctr Sash	F	Metal	Silver	-0.2	QM
130	009	File Room	A	Door		Ctr Casing	F	Metal	Tan	-0.2	QM
131	009	File Room	A	Door		Ctr Face	F	Wood	Stained	-0.3	QM
132	009	File Room	B	Shelving		Ctr	F	Wood	Tan	-0.2	QM
133	009	File Room	D	Shelving		Ctr	F	Wood	Tan	-0.2	QM
134	009	File Room	A	Pipe		Ctr	P	Metal	White	-0.1	QM
135	009	File Room	D	Pipe		Rgt	F	Metal	Tan	-0.1	QM
136	010	Ticket Offi	A	Wall	W	Ctr	F	Plaster	Cream	-0.1	QM
137	010	Ticket Offi	B	Wall	W	Rgt	F	Plaster	Cream	-0.1	QM
138	010	Ticket Offi	C	Wall	W	Ctr	F	Plaster	Cream	-0.3	QM
139	010	Ticket Offi	D	Wall	W	Ctr	F	Plaster	Cream	-0.4	QM
140	010	Ticket Offi	A	Baseboard		Ctr	F	Vinyl	Tan	0.0	QM
141	010	Ticket Offi	D	Closet		Rgt Wall	F	Plaster	Tan	0.0	QM
142	010	Ticket Offi	D	Closet		Rgt Door Casing	F	Wood	Stained	-0.2	QM
143	010	Ticket Offi	D	Closet		Rgt Door Face	F	Wood	Stained	-0.3	QM
144	010	Ticket Offi	B	Counter		Ctr	F	Wood	Stained	-0.5	QM
145	010	Ticket Offi	A	Door		Lft Casing	F	Metal	Tan	-0.2	QM
146	010	Ticket Offi	A	Door		Lft Face	F	Wood	Stained	-0.2	QM
147	010	Ticket Offi	B	Door		Rgt Face	F	Wood	Stained	-0.1	QM
148	010	Ticket Offi	B	Door		Rgt Casing	F	Metal	Tan	-0.2	QM
149	010	Ticket Offi	C	Window		Lft Sash	F	Metal	Silver	-0.3	QM
150	010	Ticket Offi	C	Window		Lft Sill	F	Wood	Stained	-0.2	QM
151	011	Roof	C	Siding		Rgt	P	Metal	Cream	-0.1	QM
152	011	Roof	B	Siding		Rgt	P	Metal	Cream	-0.3	QM
153	011	Roof	D	Siding		Rgt	P	Metal	Cream	-0.1	QM
154	011	Roof	B	Sign		Rgt	F	Metal	Blue	-0.2	QM
155	011	Roof	D	Sign		Lft	F	Metal	Blue	-0.2	QM
156	012	BkVestibule	D	Door		Ctr Casing	F	Metal	Tan	-0.2	QM
157	012	BkVestibule	D	Door		Ctr Face	F	Wood	Stained	-0.3	QM
158	012	BkVestibule	D	Baseboard		Lft	F	Vinyl	Tan	-0.1	QM
159	012	BkVestibule	B	Vent		Ctr	F	Metal	Tan	-0.1	QM
160	012	BkVestibule	B	Pipe		Ctr	F	Wrap	Tan	-0.2	QM
161	013	FtVestibule	B	Pipe		Ctr	F	Wrap	Tan	-0.2	QM
162	013	FtVestibule	B	Vent		Ctr	F	Metal	Tan	-0.3	QM
163	014	WtingLounge	A	Ceiling		Ctr	I	Plaster	Brown	-0.2	QM
164	014	WtingLounge	A	Wall	W	Ctr	F	Plaster	Brown	-0.2	QM
165	014	WtingLounge	B	Wall	W	Ctr	F	Plaster	Brown	-0.3	QM
166	014	WtingLounge	C	Wall	W	Ctr	F	Plaster	Brown	-0.3	QM
167	014	WtingLounge	D	Wall	W	Ctr	F	Wood	Stained	-0.3	QM
168	014	WtingLounge	D	Wall	W	Ctr	F	Plaster	Brown	-0.4	QM
169	014	WtingLounge	D	Baseboard		Ctr	F	Vinyl	Tan	-0.2	QM
170	014	WtingLounge	D	AirHandlingUnitRgt			F	Metal	Tan	2.0	QM
171	014	WtingLounge	D	Ledge		Lft	F	Wood	Stained	-0.3	QM
172	001	Station	A	Siding		Lft	P	Metal	White	1.0	QM

Lead-Based Paint Inspection Report

**Santa Fe Station
Lawrence, KS**

173	001	Station	A	Column	Rgt	P Metal	Cream	-0.2	QM
174	001	Station	A	Column	Ctr	P Metal	Cream	-0.2	QM
175	001	Station	A	Column	Lft	P Metal	Cream	-0.3	QM
176	001	Station	A	Overhang	Lft Ceiling	F Plaster	White	-0.2	QM
177	001	Station	A	Overhang	Lft Light Cover	P Metal	White	-0.1	QM
178	001	Station	A	Door	Rgt Casing	P Wood	Tan	0.1	QM
179	001	Station	A	Door	Rgt Jamb	P Wood	Tan	0.1	QM
180	001	Station	A	Door	Rgt Face	P Wood	Tan	-0.3	QM
181	001	Station	A	Window	Ctr Casing	F Wood	Tan	0.0	QM
182	001	Station	A	Window	Rgt Casing	F Wood	Tan	-0.1	QM
183	001	Station	A	Window	Rgt Sash	F Wood	Tan	-0.1	QM
184	001	Station	A	Window	Rgt Sill	F Wood	Tan	-0.1	QM
185	001	Station	B	Column	Rgt	P Metal	Tan	-0.3	QM
186	001	Station	B	Column	Ctr	P Metal	Tan	1.0	QM
187	001	Station	B	Column	Lft	P Metal	Tan	0.2	QM
188	001	Station	C	Column	Lft	P Metal	Tan	0.7	QM
189	001	Station	C	Column	Ctr	P Metal	Tan	-0.2	QM
190	001	Station	C	Column	Rgt	P Metal	Tan	1.0	QM
191	001	Station	C	Door	Rgt Casing	P Metal	Tan	0.2	QM
192	001	Station	C	Door	Rgt Jamb	P Metal	Orange	-0.1	QM
193	001	Station	C	Door	Rgt Face	P Metal	Tan	-0.1	QM
194	001	Station	C	Sign	Rgt	P Wood	Tan	-0.1	QM
195	001	Station	C	Door	Ctr Casing	F Metal	Tan	-0.1	QM
196	001	Station	C	Door	Ctr Face	F Metal	Tan	-0.1	QM
197	001	Station	C	Door	Lft Face	P Metal	Tan	-0.2	QM
198	001	Station	C	Door	Lft Casing	P Metal	Tan	-0.2	QM
199	001	Station	C	Door	Lft Jamb	P Metal	Tan	-0.1	QM
200	001	Station	C	Garage door	Lft Casing	F Wood	Tan	-0.2	QM
201	001	Station	C	Garage door	Lft Face	P Wood	Tan	2.2	QM
202	001	Station	C	Garage door	Lft Trim	F Metal	Tan	-0.2	QM
203	001	Station	A	Garage door	Rgt Trim	F Metal	Tan	-0.2	QM
204	001	Station	A	Garage door	Rgt Casing	F Wood	Gray	-0.1	QM
205		CALIBRATION						1.0	TC
206		CALIBRATION						1.0	TC
207		CALIBRATION						1.0	TC
208		CALIBRATION						0.1	TC
209		CALIBRATION						0.0	TC
210		CALIBRATION						0.1	TC

---- End of Readings ----

APPENDIX B
SITE DRAWING & FLOOR PLAN

APPENDIX C
PHOTO REFERENCE LOG



Deteriorated LBP on the baggage room A wall garage door casing.



Deteriorated LBP on the baggage room C wall garage door face



Deteriorated LBP on waiting lounge air handling unit



Deteriorated LBP on the exterior columns



Deteriorated LBP on the exterior C wall garage door face.



Deteriorated LBP on the exterior A wall siding

APPENDIX D
LBP SCOPE OF RENOVATION WORK/PROCEDURES

ROOM	COMPONENT	ACTION	LOCATION / APPROXIMATE QUANTITY
Baggage Room	Overhead garage door frame	Prep/Paint using EPA RRP Lead Safe Work Practices as shown below	"A" wall overhead door-25 LF
Baggage Room	Overhead garage door face	Prep/Paint using EPA RRP Lead Safe Work Practices as shown below	"C" wall overhead door- 65 SF
Waiting Lounge	Air handling unit	Prep/Paint using EPA RRP Lead Safe Work Practices as shown below	"D" wall - Right - 100 SF
Exterior	Metal panel siding	Prep/Paint using EPA RRP Lead Safe Work Practices as shown below	All sides of structure above windows & platform cover "A" wall (South) - 85 SF "B" wall (West) - 16 SF "C" wall (North) - 102 SF "D" wall (East) - 16 SF
Exterior	Metal columns	Removal/replacement of columns using EPA RRP Lead Safe Work Practices as shown below	A, B & C sides of structure at exterior platform area - 20 columns
Exterior	Garage Door Face	Prep/Paint using EPA RRP Lead Safe Work Practices as shown below	C side of structure - 65 SF

Requirements for Renovation Contractors Include:

Certification and Training Requirements

- Firms must have a "Certified Renovator" assigned to each job where lead-based paint is disturbed. To become certified, a renovator must successfully complete an EPA or State-approved training course conducted by a training program accredited by EPA or an EPA authorized state program.
- All renovation workers must be trained. Renovation workers can be trained on-the-job by a Certified Renovator to use lead safe work practices, or they can become Certified Renovators themselves.

Work Practice Requirements:

- Renovators must use work-area containment to prevent dust and debris from leaving the work area.
- Certain work practices are prohibited. Open-flame burning, using heat guns at greater than 1,100 degrees Fahrenheit and the use of power tools without high-efficiency particulate air (HEPA) exhaust control (to collect dust generated) are prohibited.

- Thorough cleaning followed by a cleaning verification procedure to minimize exposure to lead-based paint hazards is required.
- Minor repair and maintenance activities (6 square feet or less per interior room or 20 square feet or less per exterior project) are exempt from the work practices requirements. However, this exemption does not apply to jobs involving window replacement or demolition, or that involve the use of any of the prohibited practices listed above.

Contain the work area to prevent the escape of dust and debris:

The goal of proper setup of the work area is to keep dust in the work area and non-workers out. To keep the dust in and people out of your work area, you must take the steps below for inside or outside jobs.

Post Signs

You must post signs clearly defining the work area and warning occupants and other persons not involved in renovation activities to remain outside of the work area. These signs should be in the primary language of the occupants and should say “Warning – Lead Work Area” and “Poison, No Smoking or Eating.” Also remember to keep pets out of the work area for their safety and to prevent them from tracking dust and debris throughout the structure.

For Inside Jobs

- Remove all objects from the work area, including furniture, rugs, and window coverings, or cover them with plastic sheeting with all seams and edges taped or otherwise sealed.
- Cover the floor surface, including installed carpet, with taped-down plastic sheeting in the work area 6 feet from the area of paint disturbance or a sufficient distance to contain the dust, whichever is greater. If a vertical containment system is employed, floor covering may stop at the vertical barrier, providing it is impermeable, extends from floor to ceiling, and is tightly sealed at floors, ceilings, and walls.
- Close windows and doors in the work area. Doors must be covered in plastic sheeting. When the work area boundary includes a door used to access the work area it must be covered in a way that allows workers to pass, but also confines dust and debris to the work area. One method is to cover the door with two layers of protective sheeting as described here:
 - Cut and secure one layer of sheeting to the perimeter of the door frame. Do not pull the sheeting taut. Rather, leave slack at the top and bottom of the door before taping or stapling.
 - Cut a vertical slit in the middle of the sheeting leaving 6” uncut at the top and bottom. Reinforce with tape.
 - Cut and secure a second layer of sheeting to the top of the door.

- Close and cover all ducts opening in the work area with taped-down plastic sheeting.
- Ensure that all personnel, tools, and other items, including the exteriors of containers of waste, are free of dust and debris before leaving the work area.

For Outside Jobs

- Cover the ground with plastic sheeting or other disposable impermeable material extending 10 feet beyond the perimeter of surfaces undergoing renovation or a sufficient distance to collect falling paint debris, whichever is greater. If the renovation will affect surfaces within 10 feet of the property line, then vertical containment or equivalent extra precautions must be erected to prevent contamination of adjacent buildings and property.
- Close all doors and windows within 20 feet of the renovation. On multi-story buildings, close all doors and windows within 20 feet of the renovation on the same floor as the renovation, and close all doors and windows on all floors below that are the same horizontal distance from the renovation.
- Ensure that doors within the work area that will be used while the job is being performed are covered with plastic sheeting or other impermeable material in a manner that allows workers to pass through while confining dust and debris to the work area.
- In certain situations, the renovation firm must take additional precautions in containing the work area to ensure that dust and debris from the renovation does not contaminate other buildings or other areas of the property or migrate to adjacent properties.
- When working on the 2nd story or above, you should extend the sheeting farther out and to each side where paint is being disturbed.
- It is also a good idea to use vertical containment if work is close to a sidewalk, street, or property boundary, or the building is more than three stories high.
- Avoid working in high winds if possible. EPA's rule does not address wind speed, but when the wind is strong enough to move dust and debris, precautions need to be taken to keep the work area contained. That may mean creating a wind screen of plastic at the edge of the ground-cover plastic to keep dust and debris from migrating. Ultimately, you are responsible for preventing dust and debris from leaving the work area, so take appropriate precautions when wind is a factor or consider rescheduling the renovation for a less windy day.

Do Not Use Prohibited Practices

The Renovation, Repair and Painting Rule prohibit the following dangerous work practices by contractors:

- Open-flame burning or torching of painted surfaces
- The use of machines designed to remove paint or other surface coatings through high speed operation such as sanding, grinding, power planing, needle gun, abrasive blasting, or sandblasting, on painted surfaces unless such machines have shrouds or containment systems and are equipped with a HEPA vacuum attachment to collect dust and debris at the point of

generation. Machines must be operated so that no visible dust or release of air occurs outside the shroud or containment system.

- Operating a heat gun on painted surfaces at temperatures greater than 1,100 degrees Fahrenheit

Control the spread of dust

- You must keep the work area closed off from the rest of the structure. The work area must be sufficiently isolated and maintained to prevent the escape of dust or debris.
- You must ensure that all personnel, tools, and all other items exiting the work area are free of dust and debris. Don't track dust out of the work area:
- Vacuum all personnel leaving the work area, pay particular attention to the soles of shoes. Consider disposable protective clothing and shoe covers to minimize the contamination of work clothes and shoes. Also, a large disposable tack pad on the floor can help to clean the soles of your shoes.
- Vacuum and/or wipe down, as necessary, all tools and other items exiting the work area.
- You should launder non-disposable protective clothing separately from family laundry.

Use the right tools

- You should use wet sanders and misters to keep down the dust created during sanding, drilling and cutting.
- You must use HEPA vacuum attachments on power sanders and grinders to contain the dust created by these tools.
- When a heat gun is needed to remove paint or other surface coatings, you must use a temperature setting below 1,100 degrees Fahrenheit.

Use work practices that minimize dust

- You should mist areas before sanding, scraping, drilling and cutting to keep the dust down (except within 1 foot of live electrical outlets).
- You should score paint with a utility knife before separating components.
- You should pry and pull apart components instead of pounding and hammering.
- You must keep components that are being disposed of in the work area until they are wrapped securely in heavy plastic sheeting or bagged in heavy duty plastic bags. Once wrapped or bagged, remove them from the work area and store them in a safe area away from residents.

The work area should be left clean at the end of every day and must be cleaned thoroughly at the end of the job. On a daily basis, you should:

- Pick up as you go. Put trash in heavy-duty plastic bags.
- Vacuum the work area with a HEPA vacuum cleaner frequently.
- Clean tools at the end of the day.
- Wash up each time you take a break and before you go home.
- Dispose of or clean off your personal protective equipment.
- Remind residents to stay out of the work area.

When the job is complete, you must clean the work area until no dust, debris or residue remains:

Interior and exterior renovations

- Collect all paint chips and debris and seal in a heavy-duty bag.
- Remove the protective sheeting. Mist the sheeting before folding it dirty side inward, and either tape shut or seal in heavy-duty bags. Sheeting used to isolate contaminated rooms from non-contaminated rooms must remain in place until after the cleaning and removal of other sheeting. Dispose of the sheeting as waste.

Additional cleaning for interior renovations

- The firm must clean all objects and surfaces in the work area and within 2 feet of the work area, cleaning from higher to lower.
- Walls. Clean walls with a HEPA vacuum or wiping with a damp cloth.
- Remaining surfaces. Thoroughly vacuum all remaining surfaces and objects in the work area, including furniture and fixtures, with a HEPA vacuum. The HEPA vacuum must be equipped with a beater bar when vacuuming carpets and rugs.
- Wipe all remaining surfaces and objects in the work area, except carpet or upholstery, with a damp cloth. Mop uncarpeted floors thoroughly.

Waste from Renovations

- Waste from renovation activities must be contained to prevent releases of dust and debris before the waste is removed from the work area for storage or disposal.

- Collect and control all your waste. This includes dust, debris, paint chips, protective sheeting, HEPA filters, dirty water, cloths, mop heads, wipes, protective clothing, respirators, gloves, architectural components and other waste.
- Use heavy plastic sheeting or bags to collect waste. Seal the bag securely with duct tape. Consider double bagging waste to prevent tears. Large components must be wrapped in protective sheeting and sealed with tape.
- Bag and seal all waste before removing it from the work area.
- At the conclusion of each work day and at the conclusion of the renovation, waste that has been collected from renovation activities must be stored to prevent access to and the release of dust and debris.
- Waste transported from renovation activities must be contained to prevent release of dust and debris.

Dispose of waste water appropriately

- Water used for cleanup should be filtered and dumped in a toilet if local rules allow. If not, collect it in a drum and take it with you. Never dump this water down a storm drain, or on the ground. Always dispose of waste water in accordance with federal, state and local regulations.
- EPA's Web site has state information on solid and hazardous waste disposal. See the following link for further information: www.epa.gov/epawaste/wyl/stateprograms.htm

Be aware of waste disposal rules

Because EPA considers most residential renovation and remodeling as "routine residential maintenance," most waste generated during these activities is classified as solid, non-hazardous waste, and should be taken to a licensed solid waste landfill. This does not apply in commercial, public or other nonresidential child-occupied facilities, where waste may be considered hazardous and require special disposal methods. See the following link: www.epa.gov/lead/pubs/fslbp.htm. Always check state and local requirements before disposing of waste. Some are more stringent than federal regulations.

Dust Clearance Testing

Clearance testing is conducted by Certified Lead-based Paint Inspectors, Certified Lead-based Paint Risk Assessors, or Certified Lead Dust Sampling Technicians. For homes receiving federal assistance, the clearance testing must be done by a person independent of the renovation firm.

Although optional under the Renovation, Repair and Painting Rule, some states and localities may require clearance testing. Also, an owner may specifically request that a clearance test be performed in the contract. In this case, clean up the work area and check your work, then contact a Certified Lead-

based Paint Inspector, Risk Assessor or Lead Dust Sampling Technician to arrange for clearance testing.

- HUD requires clearance testing after renovation or repair work in pre-1978 homes receiving federal assistance, which are regulated under the Lead Safe Housing Rule. Contractors must determine whether the home is federally-assisted. Federal assistance may be channeled through a state or local government, community Development Corporation or other similar entity.
- Clearance sampling for interior jobs will consist of a floor sample taken in each room where work was performed (to a maximum of four samples) and an additional sample on the floor outside the entry to the work area. Where window sills and window troughs were present in the work area, a window sill or window trough sample will be collected in each room where work was performed (to a maximum of four samples).
- All clearance samples must be sent to an EPA-recognized dust-lead laboratory for analysis. You can view the list of laboratories at www.epa.gov/lead/pubs/nllap.htm.

Worker Protection:

Without the right personal protective equipment, workers may ingest or inhale lead from the job and may risk bringing lead from the worksite home to their families. The following items are available through hardware, paint, garden supply stores or other specialty suppliers.

Consider wearing:

- Disposable protective clothing covers to limit contamination of your clothing. They can be stored in a plastic bag and reused if they are fairly clean and are not torn. Small tears can be repaired with duct tape.
- Disposable shoe covers to prevent the tracking of dust from the work area and to protect your shoes from exposure to dust.
- A painter's hat to protect your head from dust and debris. These are easy to dispose of at the end of the day.

Respiratory protection:

- When work creates dust or paint chips, workers should wear respiratory protection, such as an N-100 disposable respirator, to prevent them from breathing leaded dust.
- No smoking, drinking or eating in the work area. You should not eat, drink or smoke in a lead work area because dust and debris that comes in contact with these items can contaminate them and cause the ingestion of lead when consumed.
- Wash up. Workers should wash their hands and faces each time they stop working. It is especially important to wash up before eating and at the end of the day.
- Wash your work clothes separately from family laundry.

Note: OSHA rules may require employers to take further steps to protect the health of workers on the job. See www.osha.gov/SLTC/lead/index.html.

APPENDIX E
COPIES OF LEAD LICENSES/CERTIFICATES

Kansas Department of Health and Environment

Be it known, that having properly filed application with the Kansas Department of Health and Environment,

Hernly Environmental, Inc.
is hereby licensed as a
Lead Activity Firm
KS14-2821

Date: February 6, 2014 Expiration Date: January 29, 2016


Secretary, Robert Moser, MD
Kansas Department of Health and Environment



Kansas Department of Health and Environment

Be it known, that having properly filed application with the Kansas Department of Health and Environment,

Michelle Nelson
is hereby certified as a
Risk Assessor
Certification Number : KS05-4153

Date: April 26, 2013 Expiration Date: May 9, 2015


Secretary, Robert Moser, MD
Kansas Department of Health and Environment





APPENDIX F
ADDITIONAL LEAD AND LEAD SAFETY RESOURCE DATA

GLOSSARY OF TERMS, DEFINITIONS, STANDARDS, AND RESOURCES

COMMON LBP TERMS

LBP: Any and all paint that contains at least 1 milligram of lead per square centimeter of surface area (1.0 mg/cm²). This may be expressed as 0.5% lead by weight and/or 5000 parts per million lead concentrations by dry weight.

LBP Hazards: Housing conditions that cause human exposure to unsafe levels of lead from paint. These conditions include, but are not necessarily limited to: deteriorated lead-based paint; friction, impact, or chewable surfaces; lead-contaminated dust; or, lead-contaminated soil.

Surface Coating: Any and all paints, stains, varnishes, shellacs, epoxies, lacquers, polyurethanes, etc.

House Wall Identification Guide: The exterior wall that contains the front entry to the house is labeled as the A wall of the house. Proceeding clock-wise around the house, label the remaining walls B, C, and D respectively. The interior room walls correspond to the exterior walls.

Visual Inspection: A visual evaluation of interior and exterior paint and surfaces in an effort to try to identify specific conditions that contributes to LBP hazards. A certified risk assessor or a Housing Quality Standards inspector trained in visual assessments should perform these inspections.

Paint Testing: Testing of specific surfaces that are coated with paint, by XRF (x-ray florescence) or lab analysis, to determine the lead content of these surfaces, performed by a certified LBP inspector or certified risk assessor

Risk Assessment: An on-site investigation to help determine the nature, severity, location, and existence of LBP hazards. This can include paint testing, dust and soil sampling, water sampling and a visual inspection. The risk assessment report identifies lead hazards and potential options for lead hazard control. A certified risk assessor must conduct the assessment.

Clearance Examination: Clearance is performed after hazard reduction, rehabilitation, renovation, repair, modernization, or maintenance activities to determine if a unit is safe for occupancy. It involves a visual inspection, analysis of dust and soil samples, and preparation of a report. A certified risk assessor that is independent from the company or individual conducting the lead hazard control activities should conduct the clearance examination.

X-Ray Fluorescence Analyzer (XRF): This device, often called a XRF, is used to help identify levels of lead in paint without disturbing the painted surfaces themselves. The unit uses gamma radiation to measure the lead content in the paint on a per square centimeter basis. Users of this device must be specially trained and licensed as Lead Inspectors and be licensed by State radioactive material regulatory licensing agencies.

Environmental Intervention Blood Lead Level (EIBLL): The level of lead in blood that requires intervention in a child under the age of seventy-two (72) months. This is typically defined as a blood lead level of 20 µg/dL (micrograms per deciliter) of whole blood or above for a single test, or blood levels of 15-19 in two tests taken at least three months apart.

KEY UNITS OF MEASUREMENT

µg (Microgram): A microgram is 1 one thousandth (1/1000th) of a milligram or 1 one millionth of a gram. To put this into perspective, a penny weighs 2 grams. To get a microgram, you would need to divide the penny into 2 million pieces.

mg (Milligram): a milligram is 1 one thousandth of a gram.

µg/dl (microgram per deciliter): Used to measure the level of lead in children's and adult's blood to establish whether intervention is needed. A deciliter is a little less than a half a cup.

µg/ft² (micrograms per square foot): The unit used to express levels of lead in dust samples. All reports should report levels of lead in dust in µg/ft².

mg/cm² (milligrams per centimeter square): Used to report levels of lead in paint thru XRF testing.

PPM (parts per million): Typically used to express the concentrations of lead in soil. Can also be used to express the amount of lead in a surface coating on a mass concentration basis. This measurement can also be shown as: µg/g, mg/kg or mg/l.

PPB (parts per billion): Typically used to express the amount of lead found in drinking water. This measurement is also sometimes expressed as: µg/l.

EPA/HUD Published LBP Standards

Dust-thresholds for Lead-Contamination

- Floors Less than (<) 40 µg/ft²
- Interior Window Sills < 250 µg/ft²
- Window Troughs < 400 µg/ft²

Soil-thresholds for Lead Contamination

- Play areas used by children 6 and under < 400 µg/gram or 400 parts per million (PPM)
- Other areas < 1200 µg/gram or 1200 parts per million (PPM)
- Threshold for abatement (per HUD) < 5000 µg/gram or 5000 parts per million (PPM)

ADDITIONAL RESOURCES ON LEAD AND LEAD HAZARDS

LEAD AND ENVIRONMENTAL HAZARDS ASSOCIATION

VOICE:1-800-590-6522, FAX: 301-924-0265

HUD'S OFFICE OF HEALTHY HOMES AND LEAD HAZARD CONTROL

www.hud.gov/offices/lead

VOICE: 1-202-401-0388

THE ENVIRONMENTAL PROTECTION AGENCY LEAD PROGRAMS

www.epa.gov/opptintr/lead

http://www2.epa.gov/sites/production/files/2013-11/documents/steps_0.pdf

VOICE: 1-202-260-2090

HERNLY ENVIRONMENTAL, INC.

VOICE: (785) 749-5806, FAX: (785) 749-1515

E-MAIL: info@hernly.com

WEBSITE: www.hernly.com

KANSAS DEPARTMENT OF HEALTH & ENVIRONMENT

Kansas Healthy Homes and Lead Hazard Prevention Program

WEBSITE: <http://www.kshealthyhomes.org/> Email: lead@kdhe.state.ks.us Voice: 1-866-865-3233



ENVIRONMENTAL TESTING SERVICES

LEAD PAINT • MOLD • ASBESTOS • RADON • PHASE I ESA

ASBESTOS SCREENING REPORT



Santa Fe Station
413 E. 7th Street
Lawrence, Kansas 66044

PREPARED FOR CLIENT:

City Manager
City of Lawrence - City Hall
PO Box 708
Lawrence, Kansas 66044
(785) 832-3400

PREPARED BY:

Hernly Environmental, Inc.
Michelle Nelson
AHERA Asbestos Inspector Cert. #
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HA Project No.: 150622-01M

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ENVIRONMENTAL CONSULTANT:
HERNLY ENVIRONMENTAL, INC.

PROJECT CONTACT: Michelle Nelson 6/30/2015
Name Date

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1.0 INTRODUCTION

1.1 Executive Summary

On 6/22/2015, a pre-renovation asbestos screening was completed at 413 E. 7th Street in Lawrence, Kansas by Michelle Nelson of Hernly Environmental, Inc. The purpose of the inspection was to determine the presence of ACBM (asbestos containing building materials) or suspected ACBM as identified by a prior screening, and verify that no other suspect materials exist at visible and readily accessible areas of the subject structure. A total of 23 samples were collected during the prior screening, 6 additional samples were collected of items of concern during this screening. If renovation and/or demolition work is conducted within the building, it is possible that additional suspect materials will be discovered behind walls, between floors, under flooring materials such as carpet or multiple layers of vinyl flooring, etc. Further testing is recommended if additional suspect materials are exposed. The analytical results indicated that 8 of the 26 samples collected contained greater than 1% asbestos. Please see the section of this report entitled *Findings* for a detailed list of all asbestos-containing materials identified or assumed to be present. **Please note: No information regarding the licensing, credentials, or accreditations of the prior inspector(s) or laboratory was provided to this inspector.**

1.2 Procedures

The following is a brief overview of the activities that took place during this inspection:

- Information was gathered from the Client regarding the reasons for requesting an asbestos inspection, and the specific building materials of concern.
- A space-by-space inspection of the interior of the building was conducted.
- All readily accessible and immediately available previously untested suspect materials were sampled, quantified, and assessed for friability.
- Samples were submitted to an NVLAP accredited laboratory for analysis.

1.3 Findings

On 6/22/2015, a pre-renovation asbestos screening was completed at 413 E. 7th Street in Lawrence, Kansas by Michelle Nelson of Hernly Environmental, Inc. The purpose of the inspection was to determine the presence, of ACBM (asbestos containing building materials) or suspected ACBM as identified by a prior screening and verify that no other suspect materials exist at visible and readily accessible areas of the interior of the subject structure. A total of 23 samples were collected during the prior screening, 6 additional samples were collected during this screening. If renovation and/or

demolition work is conducted within the building, it is possible that additional suspect materials will be discovered behind walls, between floors, under flooring materials such as carpet or multiple layers of vinyl flooring, etc. Further testing is recommended if additional suspect materials are exposed. The analytical results indicated that 8 of the 26 samples collected contained greater than 1% asbestos. Please note: No information regarding the licensing, credentials, or accreditations of the prior inspectors or laboratory was provided to this inspector, therefore this information is not included in this report.

Remember that all work involving ACM should always be conducted by properly trained and accredited workers utilizing the required containment, signage, and protective equipment.

IDENTIFIED ACBM

Sample #	Item Description	Location	Approx. Existing Amount/Amount to be disturbed
LWKS-DEP-001	Floor mastic	Freight office/SE Entrance vestibule/Agents office	Freight office 560 SF, Vestibule 112 SF, Agents Office 146 SF/ Vestibule 112 SF
LWKS-DEP-002	Floor tile & mastic	Freight office closet/Ticket office closet/Agents office closet	30 SF/Will not be disturbed or removed
LWKS-DEP-003	Floor tile & mastic	File room	72 SF/Will not be disturbed or removed
LWKS-DEP-015	Thermal pipe / Pipe wrap	Janitors closet	Components removed prior to 2nd inspection, not found
LWKS-DEP-017	Exterior window glazing	Exterior freight office wood windows	4 wood windows
LWKS-DEP-018	Asphalt roof flashing	Roof Perimeter & vents	800 LF/800 LF
134318-001	Exterior window caulk	All exterior window openings	33 metal windows
134318-002	Exterior door caulk	All exterior door openings	16 doors or entries

Please see Appendix D for removal/encapsulation options

1.4 Conditions & Limitations

Staff of Hernly Environmental, Inc. has performed the Client requested tasks listed above in a thorough and professional manner consistent with commonly accepted standard industry practices, using state of the art practices and best available known technology, as of the date of the assessment. The inspection was intended to locate visible and readily accessible asbestos-containing materials (ACM) and did not include destructive or invasive sampling. Therefore Hernly cannot guarantee that this Inspection has identified all asbestos-containing materials present at the subject property on the date of the Assessment. All quantities of asbestos-containing materials listed in this report are approximate and should not be used for the purpose of obtaining bids from asbestos contractors or for use in writing a scope of asbestos-related work. All quantities and locations should be confirmed by the asbestos abatement company before entering into any contractual agreements. Hernly cannot and will not warrant that the Inspection that was requested by the client will satisfy the dictates of, or provide a legal defense in

connection with, any environmental laws or regulations. It is the responsibility of the client to know and abide by all applicable laws, regulations, and standards.

The results reported and conclusions reached by Hernly are solely for the benefit of the client. The results and opinions in this report, based solely upon the conditions found on the property as of the date of the Assessment, will be valid only as of the date of the Assessment. Hernly assumes no obligation to advise the client of any changes in any real or potential asbestos hazards at this structure that may or may not be later brought to our attention. Further conditions and limitations to this contracted report are included in the general terms and conditions supplied to the client with the contract for services.

APPENDIX A LABORATORY TESTING DATA

Note: This report dated 8/29/2005 was provided to Hernly Environmental, Inc. with no additional information.

State: KS City: LAWRENCE Facility: LAWRENCE

Building Name: OLD SANTA FE DEPOT

Latitude: Longitude:

Inspection Date: 8/29/2005

Sample Number	Description	General Area	Class	Amount	Units	Condition	Asbestos	Type	Status
LWKS-DEP-001	12" FLOOR TILE/MASTIC	OFFICE #2, EAST SIDE	N.F.	I	800 S.F.	CHRY	SOTILE		
	(MASTIC)								
	IN-PLACE								
LWKS-DEP-002	9" FLOOR TILE/MASTIC	OFFICE #1 STORAGE AREA	N.F.	I	10 S.F.	CHRY	SOTILE		
	(MASTIC)								
	IN-PLACE								
LWKS-DEP-002	9" FLOOR TILE/MASTIC	OFFICE #1 STORAGE AREA	N.F.	I	10 S.F.	CHRY	SOTILE		
	(TILE)								
	IN-PLACE								
LWKS-DEP-003	9" FLOOR TILE/MASTIC	STORAGE ROOM	N.F.	I	72 S.F.	CHRY	SOTILE		
	(MASTIC)								
	IN-PLACE								
LWKS-DEP-003	9" FLOOR TILE/MASTIC	STORAGE ROOM	N.F.	I	72 S.F.	CHRY	SOTILE		
	(TILE)								
	IN-PLACE								
LWKS-DEP-004	WALL PLASTER	CEILING WEST SIDE OF COUNTER							
	N/A	0 S.F.	N/A	NON-ACM	N/A				
LWKS-DEP-005	WALL PLASTER	WEST SIDE OF WAITING AREA WALLS							
	N/A	0 S.F.	NON-ACM	N/A					
LWKS-DEP-006	2' X 4' CEILING TILE	HALLWAY EAST SIDE	N/A	0 S.F.	N/A	NON-ACM	N/A		
LWKS-DEP-007	12" X 12" CEILING TILE	WAITING AREA, EAST END	N/A	0 S.F.	N/A	NON-ACM	N/A		
LWKS-DEP-008	PIPE INSULATION	STRAIGHTS/GARAGE	N/A	0 S.F.	N/A	NON-ACM	N/A		
LWKS-DEP-009	PIPE INSULATION	HVAC AREA	N/A	0 S.F.	N/A	NON-ACM	N/A		
LWKS-DEP-010	PIPE INSULATION	STRAIGHTS/HALLWAY	N/A	0 S.F.	N/A	NON-ACM	N/A		
LWKS-DEP-011	PIPE INSULATION	ELBOWS OFFICE #1	N/A	0 S.F.	N/A	NON-ACM	N/A		
LWKS-DEP-012	PIPE INSULATION	ELBOWS RESTROOM #2	N/A	0 S.F.	N/A	NON-ACM	N/A		
LWKS-DEP-013	PIPE INSULATION	RESTROOM #2	N/A	0 S.F.	N/A	NON-ACM	N/A		
LWKS-DEP-014	SHEETROCK	GARAGE	N/A	0 S.F.	N/A	NON-ACM	N/A		
LWKS-DEP-015	TRANSITE PIPE	WATER HEATER CLOSET	N.F.	II	L.F.	CHRY	SOTILE	IN-PLACE	
LWKS-DEP-016	PIPE FITTING	HVAC UNIT	N/A	0 S.F.	N/A	NON-ACM	N/A		
LWKS-DEP-017	WINDOW GLAZING	EXTERIOR WINDOW, OFFICE #2	N.F.	II	L.F.	CHRY	SOTILE	IN-PLACE	
LWKS-DEP-018	ASPHALT FLASHING	ROOF	N.F.	I	L.F.	CHRY	SOTILE		
	(TAR #2)								
	IN-PLACE								
LWKS-DEP-018	ASPHALT FLASHING	ROOF	N.F.	I	L.F.	CHRY	SOTILE		
	(TAR)								
	IN-PLACE								
LWKS-DEP-019	ROOFING MATERIAL (CORE)	ROOF	N/A	0 S.F.	N/A	NON-ACM	N/A		
LWKS-DEP-020	EXPANSION JOINT	ROOF	N/A	0 S.F.	N/A	NON-ACM	N/A		



Analysis Report

Schneider Laboratories Global, Inc

2512 W. Cary Street • Richmond, Virginia • 23220-5117
 804-353-6778 • 800-785-LABS (5227) • Fax 804-359-1475

Customer: Hernly Environmental, Inc. (2193)
Address: 920 Massachusetts St Ste #2
 Lawrence, KS 66044

Order #: 133214

Attn:
Project: Santa Fe Station
Location: Lawrence KS
Number: 150622-01M

Received 06/24/15
Analyzed 06/28/15
Reported 06/29/15

PO Number:

Method: EPA 600/R-93/116 & 600/M4-82-020

PLM Analysis

Sample ID	Collected	Cust. ID	Location	Asbestos Fibers	Other Materials
133214-001	06/22/15	1	Ticket Office		
Layer 1: Floor Tile White, Organically Bound				None Detected	100% NON FIBROUS MATERIAL
133214-002	06/22/15	2	Ticket Office		
Layer 1: Ceiling Tile White, Fibrous				None Detected	90% CELLULOSE FIBER 10% NON FIBROUS MATERIAL
133214-003	06/22/15	3	Boiler Room		
Layer 1: Cementitious Mtrl Gray, Granular				None Detected	100% NON FIBROUS MATERIAL

Analyst: Abdelfadiel, Elsamani
 133214-06/29/15 09:06 AM


 Reviewed By: **John Wilson**
 Analyst

Method reporting limit is 1%. PLM analysis is based on Visual Estimation and NESHAP recommends that any asbestos content less than 10 percent be verified by PLM Point Count or TEM Analysis. This report must not be reproduced except in full with the approval of the laboratory. The test results reported relate only to the samples submitted.



Analysis Report

Schneider Laboratories Global, Inc

2512 W. Cary Street • Richmond, Virginia • 23220-5117
 804-353-6778 • 800-785-LABS (5227) • Fax 804-359-1475

Customer: Hernly Environmental, Inc. (2193)
Address: 920 Massachusetts St Ste #2
 Lawrence, KS 66044

Order #: 134318

Attn:
Project: Santa Fe Station
Location: 413 E 7th St
Number: 150701-01M

Received 07/02/15
Analyzed 07/02/15
Reported 07/02/15

PO Number:

Method: EPA 600/R-93/116 & 600/M4-82-020

PLM Analysis

Sample ID	Collected	Cust. ID	Location	Asbestos Fibers	Other Materials
134318-001	07/01/15	1	Window Caulk		
Layer 1: Window Caulk				2% FIBROUS TREMOLITE	95% NON FIBROUS MATERIAL
Gray, Granular					3% WOLLASTONITE
134318-002	07/01/15	2	Door Caulk		
Layer 1: Caulk				2% FIBROUS TREMOLITE	98% NON FIBROUS MATERIAL
Gray, Granular					
134318-003	07/01/15	3	Cove Base/Mastic		
Layer 1: Cove Base				None Detected	5% CELLULOSE FIBER
Black, Bituminous					95% NON FIBROUS MATERIAL
Layer 2: Mastic				None Detected	3% CELLULOSE FIBER
Brown, Brittle					97% NON FIBROUS MATERIAL

Analyst: Wilson, John
 134318-07/02/15 03:43 PM

Ali Eltom
 Reviewed By: **Ali Eltom**
 Analyst

Method reporting limit is 1%. PLM analysis is based on Visual Estimation and NESHAP recommends that any asbestos content less than 10 percent be verified by PLM Point Count or TEM Analysis. This report must not be reproduced except in full with the approval of the laboratory. The test results reported relate only to the samples submitted.

APPENDIX B
PHOTO REFERENCE



**Freight office floor 9x9 floor tiles/mastic
under all tiles**



Freight office closet 9x9 floor tiles/mastic



**Agents office floor & closet 9x9 floor
tiles/mastic under all tiles**



Ticket office closet 9x9 floor tiles/mastic



File room 9x9 floor tiles/mastic



Roof flashing



Window glazing on wood windows at exterior of freight office

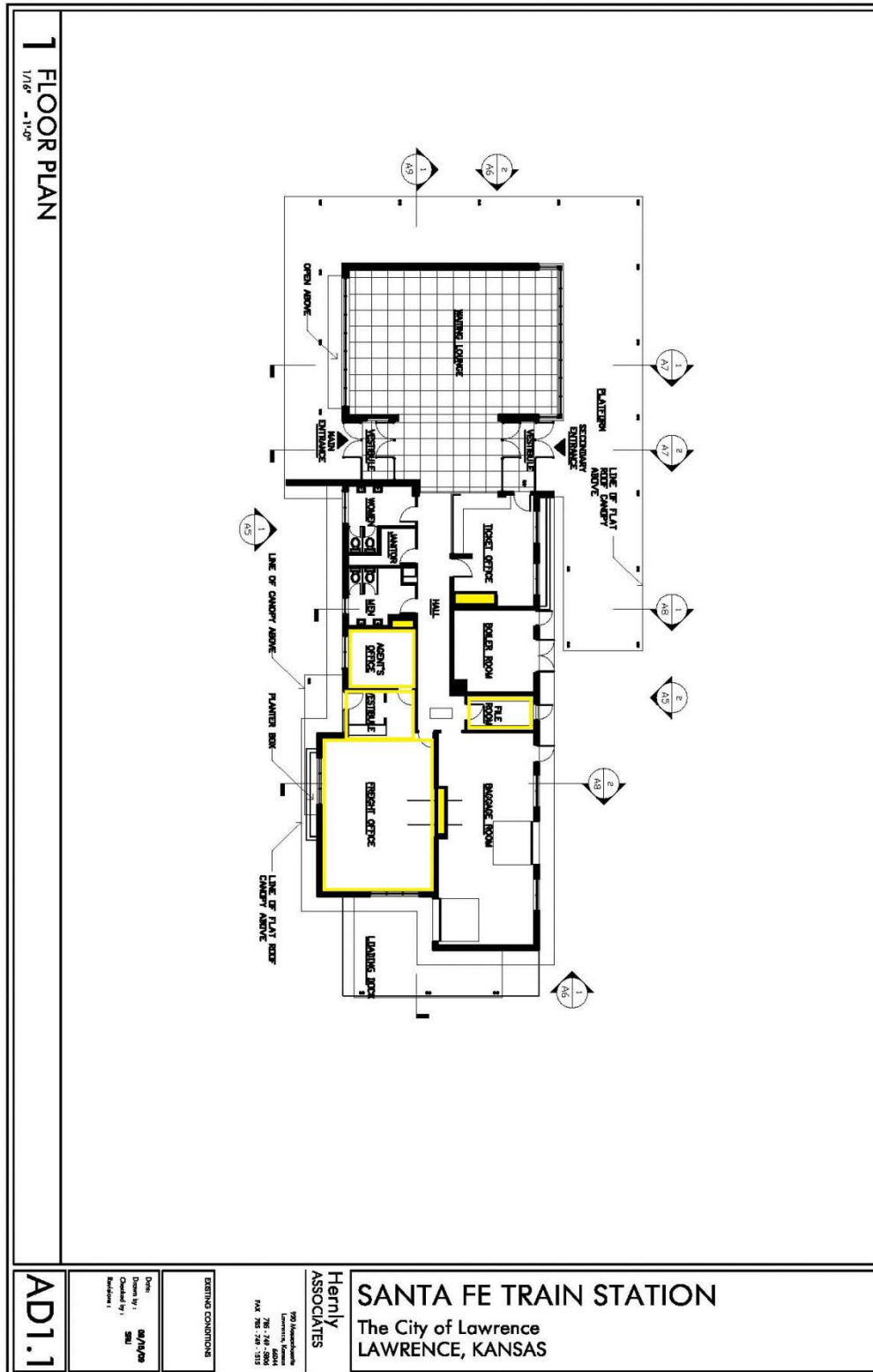


Caulk at exterior window



Caulk at exterior door

APPENDIX C
SITE DRAWING



Highlighted areas indicate interior spaces with asbestos containing materials

APPENDIX D

SCOPE OF RENOVATION WORK/PROCEDURES

Please note: It is ultimately the contractor's responsibility to follow all state and local regulations regarding notification, signage, worker protection, proper removal and disposal as it applies to any asbestos related activities.

Sample #	Item Description	Location	Approx. Existing Amount/Amount to be disturbed
LWKS-DEP-001	Floor mastic	Freight office/SE Entrance vestibule/Agents office	Freight office 560 SF, Vestibule 112 SF, Agents Office 146 SF/ Vestibule 112 SF
LWKS-DEP-002	Floor tile & mastic	Freight office closet/Ticket office closet/Agents office closet	30 SF/Will not be disturbed or removed
LWKS-DEP-003	Floor tile & mastic	File room	72 SF/Will not be disturbed or removed
LWKS-DEP-015	Thermal pipe / Pipe wrap	Janitors closet	Components removed prior to 2nd inspection, not found
LWKS-DEP-017	Exterior window glazing	Exterior freight office wood windows	4 wood windows
LWKS-DEP-018	Asphalt roof flashing	Roof Perimeter & vents	800 LF/800 LF
134318-001	Exterior window caulk	All exterior window openings	33 metal windows
134318-002	Exterior door caulk	All exterior door openings	16 doors or entries

The regulations detailed below are reprinted from the State of Kansas Regulations Governing Asbestos Abatement Projects.

Work practices for asbestos-removal projects in occupied spaces

(a) Each asbestos-removal project that involves the removal of friable asbestos-containing materials from a structural item or equipment that is located in any area that can be expected to subsequently be re-occupied by any person after the project is completed, or in an area that is only directly accessible from an area that is, or subsequently will be, occupied by any person other than persons directly involved in the project, shall be conducted in accordance with the following requirements:

(1) Each proposed work area shall be isolated from other areas of the building and outside areas by erecting temporary partitions that are rigid and airtight around the work area or by installing airtight seals over doorways, windows, and ventilation system openings, except that doorways between the work area and decontamination facilities and waste load-out areas shall be closed off with a control curtain. At least one temporary partition or seal shall contain a clear viewing area that is 18 inches or more in height and width and is installed in a manner that will allow direct visual observation of the work area from a location outside of the work area. Plastic sheeting used for the construction of airtight seals shall be not less than four mils thick. Whenever possible, each heating and ventilation system serving the work area shall be shut down and locked out. If these systems cannot be shut down, special provisions shall be made to assure that airborne contamination from the work area cannot enter the ventilation system and be carried to other areas of the building. Appropriate warning signs shall be prominently posted at all entryways into the work area. Provisions shall be made to prevent any person other than those persons having responsibilities directly related to the project from entering the area before the requirements of paragraphs (9) and (12) of this subsection are met and the project is approved in accordance with all other applicable requirements.

(2) All movable furnishings, equipment, and fixtures in the proposed work area shall be pre-cleaned with a HEPA filter-equipped vacuuming device or wet cleaning methods. After cleaning, the items shall be removed from the work area and stored in an area that is not subject to contamination with asbestos fibers. The items shall not be returned to the work area until final room cleanup has been completed and approved in accordance with requirements applicable to the project.

(3) All structural item surfaces, other than those from which asbestos is to be removed, and all non-movable furnishings, equipment, and fixtures remaining in the proposed work area shall be pre-cleaned with a HEPA filter-equipped vacuuming device or wet cleaning methods and covered with not less than four-mil-thick plastic sheeting, except that floors shall be covered with a minimum of two layers of six-mil-thick plastic sheeting that extends up the walls at least 12 inches. Plastic sheeting on walls shall be affixed to the wall in a manner that assures that it will

remain in position throughout the length of the project and shall overlap the floor sheeting at least 12 inches above the intersection of the walls with the floor. Any tears that are noted in the protective plastic sheeting required by this subsection shall be immediately repaired.

(4) HEPA filter-equipped ventilation fans shall be installed in a manner that will continually exhaust air from all locations within the work area. The total capacity of the fans shall be sufficient to remove the entire volume of air contained in the workroom area within 15 minutes or less, unless a longer time period is specifically approved by the department. The removed air shall be discharged through a duct that has been installed through the plastic on the walls in a manner that will provide an airtight seal between the plastic and the outside surface of the duct. The exhausted air shall be discharged outside of the building whenever possible and shall not be discharged inside the building, unless this discharge is specifically approved by the department in writing. Each ventilation fan shall be continuously operated throughout the duration of the project until the action required by paragraph (12) of this subsection is completed. Each fan shall be operated in a manner that establishes, and maintains, a flow of air into the work area from all adjacent areas of the building as demonstrated by use of smoke-producing tubes. At a minimum, these determinations shall be made and the results recorded before initiation of asbestos-removal operations and at the start of each day's operation.

(5)(A) A decontamination facility shall be provided between the work areas and building areas intended to remain uncontaminated with asbestos fibers generated by the asbestos-removal operations. All persons entering or leaving the work area shall pass through and use the decontamination facility. Each decontamination facility shall consist of the following designated areas, which are each to be entered through a doorway that is covered by a control curtain:

(i) A clean room that shall be maintained free of asbestos-containing debris and shall be first entered by any persons entering the work area. The clean room shall be constructed in a manner that provides adequate space for removing or putting on street clothing, putting on and fit-testing respirators, and putting on protective clothing and other protective equipment required to be worn in the work area.

(ii) A shower room that shall be first passed through by any person that moves from the work area into the clean room. These persons shall be required to shower before entering the clean room. Each shower room shall be provided with at least one shower head that is supplied with hot and cold water. Adequate quantities of soap, hair shampoo, and towels shall be provided to accommodate each person who emerges from the work area. Shower enclosures shall be leak proof and constructed of disposable or easily washable material. Shower water may be drained directly into the building's plumbing system or collected for subsequent disposal in accordance with the requirements of K.A.R. 28-50-14.

(iii) An equipment room that shall be passed through before the shower room can be entered from the work area. The equipment room shall be used for temporary storage of contaminated tools, equipment, and protective clothing used in the work area. The floor and walls of the room shall be lined with not less than six-mil-thick plastic sheeting. Tools, equipment, and protective clothing shall be free of gross contamination before removal from the work area into the equipment room.

(B) All decontamination facility areas shall be fully enclosed and shall be contiguous to each other and the work area unless connected to one another by enclosed passageways that are effectively isolated from areas intended to remain free of asbestos contamination. Decontamination facilities shall remain in place and in functional condition until removal of airtight seals and partitions is authorized in accordance with the requirements of K.A.R. 28-50-9(a)(12).

(6) A waste load-out area may be constructed between the work area and the exit through which asbestos containing waste materials are intended to be removed from the work area. If a waste load-out area is provided, it shall be totally enclosed, and the doorway between the work area and the waste load-out area shall consist of a combination of control curtain and rigid door. The floor of the load-out area shall be covered with not less than six-mil-thick plastic sheeting, which shall be kept clean and free of visible asbestos-containing debris. Floor covering shall be removed upon completion of the project and disposed of in compliance with the requirements of K.A.R. 28-50-14. Asbestos-containing waste shall not be transferred from the waste load-out area unless it has been placed in containers that comply with the requirements of K.A.R. 28-50-14(a). Waste containers shall be removed from the waste load-out area only by persons who enter the load-out area from an area that is intended to be maintained free of asbestos-containing debris generated by the removal operations. The doorway between the work area and

load-out area shall be kept secured except when waste materials are being transferred from the work area. The load-out area doorway shall not be used as an entrance or exit by persons who leave or enter the work area.

(7) All exposed surfaces of friable asbestos-containing materials shall be maintained in a wet condition while the material is being removed or cleaned up from structural or equipment items. Any friable asbestos-containing material shall be wetted with a water solution containing an effective wetting agent. The wetting solution shall be applied with a low pressure spraying system. The effectiveness of the solution in penetrating the asbestos-containing materials shall be determined by applying it to a small representative sample of the material before the gross removal operation is initiated. The removed friable asbestos-containing materials shall be maintained in a wet condition until placed in sealed containers for disposal in accordance with the requirements of K.A.R. 28-50-14. All accumulations of loose debris shall be removed from floors and other surfaces and placed in sealed bags or containers as quickly as practicable and at least daily.

(8) After the asbestos-containing materials have been removed from the structural or equipment items, all plastic sheeting, equipment, and surfaces in the work area shall be cleaned with a HEPA filter-equipped vacuuming device or by wet cleaning methods and shall be free of all visible debris, but if more than one layer of plastic sheeting has been used on walls and floors, this additional layer of sheeting may be removed and disposed of instead of being cleaned. Sheetting that is removed shall be disposed of in compliance with the requirements of K.A.R. 28-50-14. Any liquid or material that has leaked through these additional layers of sheeting shall be removed by wet cleaning methods.

(9) The surfaces from which the friable asbestos-containing materials have been removed shall be cleaned free of all visible residues and then covered with an effective sealing material before the final layer of plastic sheeting covering the floors, walls, and non-movable items is removed.

(10) After the sealant has dried, the plastic wall and floor coverings shall be removed and disposed of in compliance with the requirements of K.A.R. 28-50-14. After removal of the plastic wall and floor coverings, all surfaces in the work area shall be cleaned with a HEPA filter-equipped vacuuming device or by wet cleaning methods and shall be free of all visible debris.

(11) After completing the requirements in paragraph (10) of this subsection, clearance monitoring, as described in 40 C.F.R. 763.90(i), as in effect on July 1, 1998, and hereby adopted by reference, may be conducted. In the absence of clearance monitoring, an air stream from a high speed leaf blower or equivalent device shall be swept across all surfaces within the work area for a period of not less than five minutes for each 1,000 square feet of surface area.

(12) Each temporary partition and airtight seal provided for doors, windows, and duct openings in accordance with paragraph (1) of this subsection shall remain in place until the sampling results from the clearance monitoring, referenced in K.A.R. 28-50-9(a)(11), indicate compliance or in the absence of clearance monitoring, the temporary partitions and airtight seals shall remain in place for no fewer than 24 hours after completion of the actions required by paragraph (11) of this subsection and until the cleanup is approved in accordance with any other special requirements applicable to the project. (b) Any individual requirement of subsection (a) of this regulation may be waived by the department for asbestos-removal projects if the notification submitted in accordance with K.A.R. 28-50-8 identifies the requirements for which waiver is requested, the reason for requesting the waiver, and any alternate procedure that is proposed. A waiver shall not be granted unless the health and safety of the workers and building occupants are adequately protected. The following minimum requirements shall also be met:

(1) The work area in which the asbestos is to be removed shall be completely isolated from any other areas of the building by the construction or installation of airtight barriers that shall continually remain in place for the duration of the asbestos removal project until final cleanup is completed and approved in accordance with requirements applicable to the project.

(2) Appropriate warning signs shall be prominently posted at all entryways into the work area, and access to the work area shall be restricted to only those persons that are required to enter it because of responsibilities directly related to the project until the requirements of paragraphs (3) and (4) of this subsection are met and the project is approved in accordance with all other applicable requirements.

(3) The surfaces from which the asbestos-containing materials have been removed shall be cleaned free of all visible residue and covered with an effective sealant before the warning signs required by paragraph (2) of this subsection are removed and access to the work area of persons other than those directly involved in the project is permitted.

(4) All visible asbestos-containing debris shall be removed from the work area before the warning signs required by paragraph (2) of this subsection are removed or access to the work area of persons other than those directly involved in the project is permitted.

(5) Asbestos contamination shall be removed from all persons that have been in the work area before they leave the premises or enter any area intended to remain free from asbestos contamination. All equipment used on the project shall be cleaned free of visible debris before it is removed from the work area.

(6) The waiver and all proposed alternative procedures shall be approved by the department in writing before the project is initiated, except that verbal approval may be provided if the 10-day notification period has been waived in accordance with the provisions of K.A.R.28-50-8(a). (c) The requirements of subsections (a) and (b) of this regulation may be waived by the department for the removal of friable asbestos-containing materials from the surface of pipes, structural items, or other similar conduits if the following minimum requirements are met:

(1) All friable asbestos-containing materials proposed to be removed in the work area shall be removed using six-mil-thick or thicker leak-proof glove bags in accordance with the manufacturer's instructions. Glove bags shall not be used to remove asbestos-containing materials from surfaces having a temperature of 150°F or more unless written authorization to do so is provided by the department before the removal.

(2) Appropriate warning signs shall be prominently posted at all entryways into the work area. Provisions shall also be made to prevent any person other than those persons that have responsibilities directly related to the project from entering the work area until the actions required by paragraphs (6), (7), and (8) of this subsection are completed and the project is approved in accordance with all other applicable requirements.

(3) Each person using the glove bag shall avoid damaging or otherwise causing the release of asbestos fibers from any other friable asbestos-containing materials that are located within the work area, including any debris that may have accumulated in the area before the start of the project. Each section of the pipe, structural item, or conduit from which damaged or loose hanging friable asbestos-containing material is to be removed that is not immediately enclosed within a glove bag shall be tightly enclosed in six-mil-thick plastic sheeting until a glove bag is placed over it and the asbestos-containing material is removed.

(4) Glove bags shall be sealed to the pipe, structural item, or conduit in a manner that provides an airtight seal around the area from which the asbestos is to be removed until the glove bag is removed, unless the manufacturer's instructions require air pressure within the bag to be maintained below the pressure outside of the bag. Glove bags shall not be moved and used for removal at more than one location except under written authorization provided by the department and in compliance with any special requirement imposed as a condition for granting the authorization.

(5) All exposed surfaces of friable asbestos-containing materials shall be wetted with a water solution containing an effective wetting agent while the material is removed, and the removed material shall be maintained in a wet condition while it remains in the glove bag until the bag is sealed for final disposal in accordance with the requirements of K.A.R. 28-50-14.

(6) Surfaces from which asbestos-containing materials have been removed shall be cleaned free of all visible residues before the glove bag is removed.

(7) A sealing material shall be applied to all surfaces from which the asbestos-containing material is removed, and to all friable asbestos-containing material surfaces that become exposed as a result of this removal before the warning signs required by paragraph (2) of this subsection are removed or access to the work area of persons other than those directly involved in the project is permitted.

(8) The work area shall be free of all visible asbestos containing debris, including accumulations that existed before the start of the project and before the warning signs required by paragraph (2) of this subsection are removed or access to the work area of persons other than those directly involved in the project is permitted.

(9) Each project activity in the work area shall be immediately discontinued if any asbestos contamination of the general work area results from damage or improper use of the glove bags or if there is damage to any other friable asbestos-containing materials located within the area. Project activities shall not be resumed until all surfaces in the area that are likely to have become contaminated with asbestos fibers have been thoroughly cleaned with a HEPA filter-equipped vacuuming device or by wet cleaning methods. Each person who is likely to be contaminated with asbestos fibers resulting from these sources, including the cleanup operation, shall remove, or use a HEPA filter-equipped vacuuming device or wet cleaning methods to clean all contaminated outer work clothing before leaving the work area.

(d) The requirements of subsections (a) and (b) of this regulation may be waived by the department for an asbestos-removal project that involves the removal of friable asbestos-containing materials from structural items or equipment that is installed in, and accessible from, outdoor areas, if the following minimum requirements are met:

(1) Each door, window, or other opening into enclosed areas that is adjacent to the work area shall be securely covered with not less than four-mil-thick plastic sheeting if the opening is located 100 or fewer feet from the work area.

(2) A person other than the persons that have responsibilities directly related to the project shall not be allowed to occupy or pass through any unenclosed area that is located 50 or fewer feet from the work area. This area shall be identified and defined by fences or other effective means. Appropriate warning signs shall be prominently posted at all entryways into the area until the requirements of paragraphs (4) and (5) of this subsection are met and the project is approved in accordance with all other applicable requirements.

(3) All exposed surfaces of friable asbestos-containing material shall be wetted with a water solution that contains an effective wetting agent while the material is being removed. All removed material, including debris on surfaces below the location from which the material is removed, shall be maintained in a wet condition until placed in sealed containers for disposal in accordance with the requirements of K.A.R. 28-50-14.

(4) All friable asbestos-containing debris, including accumulations that existed before the start of the project, shall be removed from the work area before the warning signs required by paragraph (2) of this subsection are removed or access to the area of persons other than those having responsibilities directly related to the project is permitted.

(5) All surfaces from which asbestos-containing materials are removed shall be cleaned free of visible residues and covered with an effective sealant before the warning signs required by paragraph (2) of this subsection are removed or access to the area of persons other than those having responsibilities directly related to the project is permitted.

(6) Each person who removes asbestos-containing materials or otherwise occupies the restricted area identified in paragraph (2) of this subsection shall remove outerwear that is worn in the area before entering any enclosed area that is occupied by any person other than those persons engaged in the project.

(e) The requirements of subsections (a) and (b) of this regulation may be waived by the department for an asbestos project that involves the removal of friable asbestos-containing materials from structural items that are installed in, and accessible from, any structure or portion of a structure that is demolished after the material is removed, if the following minimum requirements are met:

(1) Appropriate warning signs shall be prominently posted at all areas into the work area, and persons other than the persons that have responsibilities directly related to the asbestos-removal project shall not be allowed to occupy or pass through the work area until the requirement of paragraph (4) of this subsection is met and the project is approved in accordance with any other applicable requirements.

(2) Each window, door, and other direct opening between any area where asbestos is to be removed and any other area of the structure that is not intended to be demolished shall be sealed airtight, with securely fastened plastic sheeting, until the project is completed. The plastic sheeting seals shall be not less than four mils thick.

(3) All exposed surfaces of friable asbestos-containing material shall be maintained in a wet condition while the material is being removed. The material shall be wetted with a water solution containing an effective wetting agent. All removed friable asbestos-containing material, including debris that falls on surfaces below the location from which the material is removed, shall be maintained in a wet condition until placed in sealed containers in accordance with the requirements of K.A.R. 28-50-14.

(4) All friable asbestos-containing debris, including accumulations that existed before the start of the project, shall be removed from the work area before the warning signs required by paragraph (1) of this subsection are removed or access to the work area of persons other than those having responsibilities directly related to the project is permitted.

(5) Each person who removes asbestos-containing materials or otherwise occupies the work area before the project is completed shall remove outerwear that is worn in the area before entering any enclosed area that is occupied by any person other than those persons engaged in the project.

(6) Structural items from which friable asbestos-containing material is removed shall not be sold or reused for any purpose unless the surfaces from which the material has been removed are free from visible residue and have been covered with an effective sealing material, unless the sealing requirement is waived by the department in writing.

(f) Each person engaged in an asbestos-removal project or entering an asbestos-removal project work area shall be provided with, and shall wear, an appropriate respirator and protective clothing.

(g) Airborne asbestos exposures of each person engaged in an asbestos-removal project shall be determined in accordance with applicable OSHA or EPA exposure monitoring requirements. Copies of the results of the analyses of samples collected at a project subject to the requirements of this regulation shall be submitted to the department as soon as practicable, after receipt of a written request for the results of the analyses from the department. (Authorized by and implementing K.S.A. 1998 Supp. 65-5303; effective, T-86-1, Jan. 6, 1986; effective May 1, 1987; amended, T-88-54, Dec. 16, 1987; amended, T-89-8, March 18, 1988; amended, T-89-15, April 26, 1988; amended Sept. 19, 1988; amended Feb. 4, 1991; amended Oct. 1, 1999.)

28-50-10. Work practices for asbestos encapsulation projects

(a) Use of encapsulation as a method of controlling asbestos fiber release from friable asbestos-containing materials on structural items or equipment shall be subject to the following requirements:

(1) Encapsulating materials shall not be applied to fibrous, sprayed-on, asbestos-containing materials or to cementitious asbestos-containing materials that show signs of poor adhesion.

(2) Encapsulating material shall not be applied to friable asbestos-containing materials that are installed on surfaces in locations that are subject to frequent abrasive or other physical damage.

(3) Penetrating encapsulating agents shall be tested for, and shall demonstrate, acceptable adhesive and penetrating characteristics. Testing shall consist of applying the encapsulant to the surface of the material in the prescribed manner and then removing a core sample of this material for physical and visual inspection. Representative testing shall be conducted at one or more randomly selected locations within the structure before initiation of the project. Test core holes shall be repaired immediately after the visual inspection is completed.

(4) Encapsulant materials shall have acceptable flame retardant characteristics and shall not be noxious or toxic to applicators or to persons that occupy the structure after the project is completed.

(5) Each damaged portion of a surface to which the encapsulant material is to be applied shall be repaired with asbestos-free patching materials before it is applied.

(b) An encapsulation project that involves the encapsulation of friable asbestos-containing materials shall be conducted in accordance with the work practices contained in 29 C.F.R. 1926.1101, as in effect on July 1, 1998 and hereby adopted by reference.

(c) Each person engaged in an asbestos-encapsulation project or entering an asbestos-encapsulation project work area shall be provided with, and shall wear, an appropriate respirator and protective clothing. (Authorized by and implementing K.S.A. 1998 Supp. 65-5303; effective, T-87-1, Jan. 6, 1986; effective May 1, 1987; amended Feb. 4, 1991; amended Oct. 1, 1999.)

28-50-11.(Authorized by and implementing K.S.A. 65-5303; effective, T-87-1, Jan. 6, 1986; effective May 1, 1987; revoked Feb. 4, 1991.)

28-50-12. Work practices for asbestos related dismantling projects

(a) Structural or equipment items that are covered with friable asbestos containing materials and are intended to be moved without first removing the asbestos containing materials from the surfaces of them shall be handled in the following manner:

(1) The removal of friable asbestos containing materials from any portion of the surface of a structural or equipment item for the purpose of mechanically disassembling or cutting the item into smaller components shall be conducted in accordance with the requirements of K.A.R. 28-50-9.

(2) Structural or equipment items, or component parts of them, that are covered with friable asbestos containing material shall either be securely wrapped in not less than a double layer of six mil thick plastic sheeting or shall be placed in a disposable fiber or metal container that is equipped with a plastic bag liner and a tight fitting and firmly attached lid before being removed from the work area. All exposed surfaces of the friable asbestos containing material covering the item or component shall be wetted with a water solution containing a wetting agent before the item or component is wrapped or placed in a container. The exterior surface of the container or wrapping shall be cleaned free of all visible residues by wet cleaning methods before the item or component is moved and the item or component shall be handled in a manner that will prevent damage to the container or wrapping. If damage to a wrapping or container occurs, a new wrapping or container shall be immediately provided and all friable asbestos containing debris released from the damaged wrapping container shall be immediately cleaned up using wet cleaning procedures or a HEPA filter equipped vacuum cleaner.

(b) Structural or equipment items, or component parts of them, that have been removed in accordance with the provisions of subsection (a) of this regulation shall be disposed of in compliance with the requirements of K.A.R. 28-50-14(a)(4) unless the friable asbestos containing material covering the items is subsequently removed in compliance with the following requirements:

(1) Items, or component parts, from which asbestos containing material is removed shall not be sold or reused for any purpose until the surfaces from which the material has been removed are free of visible residue and have been covered with an effective sealing material, unless the sealing requirement is waived by the department in writing.

(2) The removal of the friable asbestos containing material outdoors shall be carried out in compliance with the requirements of K.A.R. 28-50-9(d).

(3) The removal of the friable asbestos containing material indoors shall only be done in an area specifically designated for this purpose and in compliance with the following requirements:

(A) Access to the area must be controlled to prevent any person other than those responsible for the removal operations from entering it. An appropriate warning sign shall be posted at each entryway into the area.

(B) The area shall not be served by a common heating and ventilation system that serves other enclosed occupied areas on the premises.

(C) A local exhaust system that is approved by the department shall be provided. Air exhausted from the removal area shall be discharged to the outside air after being passed through an air cleaning device that has been approved by the department.

(D) Each person working in the area shall be provided a convenient area immediately adjacent to the removal area to take showers and change into uncontaminated clothing, unless other arrangements are approved by the department.

- (E) Each person entering into the area shall be provided with and wear an appropriate respirator and protective clothing.
- (F) The designated asbestos removal area shall not be used for any other purpose until the removal operations have been discontinued and the area has been cleaned of all visible residue and debris with a HEPA filter equipped vacuuming device or by wet cleaning methods.
- (G) All exposed surfaces of the friable asbestos containing material shall be maintained in a wet condition while the material is being removed from the structural or equipment item, or component, unless dry removal is approved by the department. The friable material shall be wetted with a water solution containing an effective wetting agent.
- (H) Friable asbestos containing materials that are removed from any structural or equipment item, or component, shall be handled in accordance with the requirements of K.A.R. 28-50-14. (Authorized by and implementing K.S.A. 65-5303; effective, T-87-1, Jan. 6, 1986; effective May 1, 1987.)

28-50-13. Work practices for asbestos-related demolition projects

(a) The following requirements shall be met before a structure that contains structural items that are covered with friable asbestos-containing material is demolished:

- (1) The structural items shall be removed from the structure in accordance with the requirements of K.A.R. 28-50-12; or
- (2) All friable asbestos-containing materials covering the structural materials shall be removed from the materials while they remain in place in accordance with the requirements of K.A.R. 28-50-9.
- (b) Any business entity, state agency, political or taxing subdivision of the state, or person that demolishes a structure which contains any structural item covered with, or composed of, asbestos fiber-containing material shall assure that the item is handled in a manner that will prevent the asbestos fibers from becoming airborne. (Authorized by K.S.A. 65-5303; implementing K.S.A. 65-5303; effective, T-87-1, Jan. 6, 1986; effective May 1, 1987; amended Feb. 4, 1991.)

28-50-14. Asbestos waste disposal

(a) All solid waste materials containing friable asbestos that result from an asbestos-removal project, an asbestos-encapsulation project, an asbestos-related dismantling project, or an asbestos-related demolition project shall be handled in the following manner:

- (1) All friable asbestos-containing waste shall be placed in tightly sealed containers in a wet condition before it is removed from the work area. Waste containers shall be double bagged in not less than six-mil-thick, liquid-tight; clear plastic bags unless the waste contains rigid or heavy objects that are likely to tear the bags. If bag damage is likely to occur, the waste shall be placed in fiber or metal containers that are equipped with a plastic bag liner and a tight-fitting lid that can be firmly fastened in position. Large sections of structural items, including pipe or ductwork that has been removed with friable asbestos-containing materials left in place, may be tightly wrapped in not less than a double layer of six-mil-thick, clear plastic sheeting for disposal purposes if they cannot be placed in containers. All exposed surfaces of the friable asbestos-containing material shall be in a wet condition when each item is wrapped.
- (2) The exterior surface of each container or individually wrapped object shall be cleaned free of all visible debris, and an asbestos label shall be securely attached before the container or wrapped object is removed from the work area to another area for storage or transport purposes.
- (3) Before each container or wrapped object of friable asbestos-containing material is removed from the work area to another area for storage or transport purposes, the waste generator shall place on the exterior of each container or wrapped object specific information that will identify the asbestos-removal project, asbestos encapsulation project, asbestos-related dismantling project, or asbestos-related demolition project at which the waste was generated. The identifying information shall be legible and printed with indelible ink. The waste generator shall mark each container or wrapped object by any of the following methods:
- (A) Printing or attaching to each container or wrapped object a label that contains the name of the licensed business entity or approved public agency that carried out the project and the project location at which the waste was generated;

(B) printing on the exterior surface of each container or wrapped object the identifying number provided by the department for each project upon receipt of a project notification submitted in compliance with the requirements of K.A.R. 28-50-8; or

(C) attaching to each container or wrapped object a label that meets the requirements of applicable federal EPA or OSHA regulations pertaining to the identification of containers or wrapped objects used for the disposal of asbestos-containing materials.

(4) Each waste container shall be carefully handled and transported in order to prevent breaking or opening. Whenever a container breaks or otherwise becomes unable to completely contain the waste, the waste shall be immediately transferred into another sealed container that complies with the requirements of paragraphs (a)(1) and (a)(2) of this regulation. Any friable asbestos-containing solid waste materials that come out of the original container shall be immediately cleaned up after being saturated with water and placed in the replacement container.

(5) Waste shall be transported in vehicles that have completely enclosed cargo areas, or a four-sided cargo area that shall be completely covered with six-mil-thick plastic sheeting or other equivalent covering while the waste is being transported. All visible debris remaining in the vehicle cargo area after the waste has been deposited at the disposal area shall be immediately removed by wet cleaning methods and disposed of in accordance with the requirements of this subsection.

(6) The waste generator shall remain responsible for storage, transport, and disposal of the waste in accordance with this subsection until the time that the waste is delivered to and accepted by the operator of an approved waste disposal site. The waste generator shall be released from further responsibility for handling of the waste when the disposal site operator acknowledges, in writing, that the delivered waste has been properly identified as friable asbestos-containing material and has been delivered in a manner and condition that is acceptable to the disposal site operator.

(b) Wastewater and other liquid waste that contains friable asbestos-containing materials that result from an asbestos-removal project, an asbestos-encapsulation project, or an asbestos-related maintenance, dismantling, or demolition operation may be disposed of by mixing them with solid waste materials and disposing of the mixture in accordance with the requirements of subsection (a) of this regulation. Wastewater that cannot be handled in this manner shall be disposed of by one of the following methods:

(1) Wastewater from decontamination showers and final cleanup of waste containers and equipment may be disposed of in public sewer systems either by discharge into the plumbing system where the waste is generated or by storing the waste and discharging it directly into the sewer system at a location designated by the operator of the system. The wastewater shall be free of any material that is likely to cause stoppage in the plumbing or sewer systems.

(2) Discharge of any other asbestos-contaminated wastewater or liquid waste or the use of any other method for the disposal of contaminated liquid wastes shall only be at a location and in a manner specifically approved by the department in writing. (Authorized by and implementing K.S.A. 1998 Supp. 65-5303; effective, T-87-1, Jan. 6, 1986; effective May 1, 1987; amended, T-88-54, Dec. 16, 1987; amended May 1, 1988; amended.

APPENDIX E
AHERA ASBESTOS INSPECTOR CERTIFICATES

